

The iTour Project:
**A Study of the Design and Testing of
Effective Online Animated Tours as a
Form of Interactive Online Documentation**

An Exegesis submitted in fulfilment of the requirements for
the degree of Doctor of Philosophy

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Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the Exegesis is the result of work which has been carried out since the official commencement date of the approved research program; and, any editorial work, paid or unpaid, carried out by a third party is acknowledged.

April Weiss

31 August 2005

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Dedications

I dedicate this research to my family

especially

my parents Richard and Renée Price

my children Lauren and David

and my beloved husband Peter

who each in their own way have made this journey possible for me.

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Abstract

The iTour Project is an empirical study of the design of online interactive animated tours (iTours), and establishes a knowledge base for technical communicators and new media designers working in this area. The key objectives of this research were to understand the features of effective iTours; to explore the processes and techniques of designing and testing effective iTours; and to establish new praxis in new media design for technical communication.

Design artefacts resulted from six key activities including: (1) Sub-project 1 – RMIT Multimedia Online documentation with basic animation; (2) Sub-project 2 – Online @ RMIT Orientation with some iTour animation; (3) Third-party iTour analytical review to ‘deconstruct’ iTours and determine key elements; (4) Sub-project 3 – Online @ RMIT iTours; (5) iTour Guidelines; and (6) A second, more comprehensive third-party iTour analysis to test the Guidelines.

The outcome of the research is encapsulated in a web site that binds the artefacts of design sub-projects with a set of Guidelines. These Guidelines form a conceptual, structural and operational framework for iTour designers, and draw on the knowledge established while designing and testing iTours, analysing third-party iTours, and researching comparative fields. These fields include technical communication; new media; web; usability design and testing; and, to a lesser extent, software design and testing. The Guidelines, in conjunction with the knowledge base, were developed to facilitate effective communication through iTours.

Through this research, the ‘design action case study’ was established as a hybrid research approach: ‘design research’ and ‘action research’ are blended; and knowledge is situated within, and derived from, a case study. In support of design research, the PDIOR design cycles have been specified and include these phases: plan; develop; implement; observe; and reflect. The PDIOR approach combines design research and action research in a cyclical mode to explore technical communication and new media activities.

Finally, eleven principles for designing effective iTours emerged from this research project. Articulation of these principles, in addition to the Guidelines, contributes new knowledge in the field for technical communicators, new media designers and others, who wish to engage in iTour design.

Viewing the Project

The web site houses the sub-projects and other iTour Project outcomes. It is in effect the webbing that links all the separate project artefacts together. The artefacts can be viewed through the web site home page, through the Guidelines or through the Exegesis document.

The Exegesis contains links to online examples within the iTour Project as illustrated in the table below. To view both the Exegesis and the project examples, you can use the online version of the Exegesis.

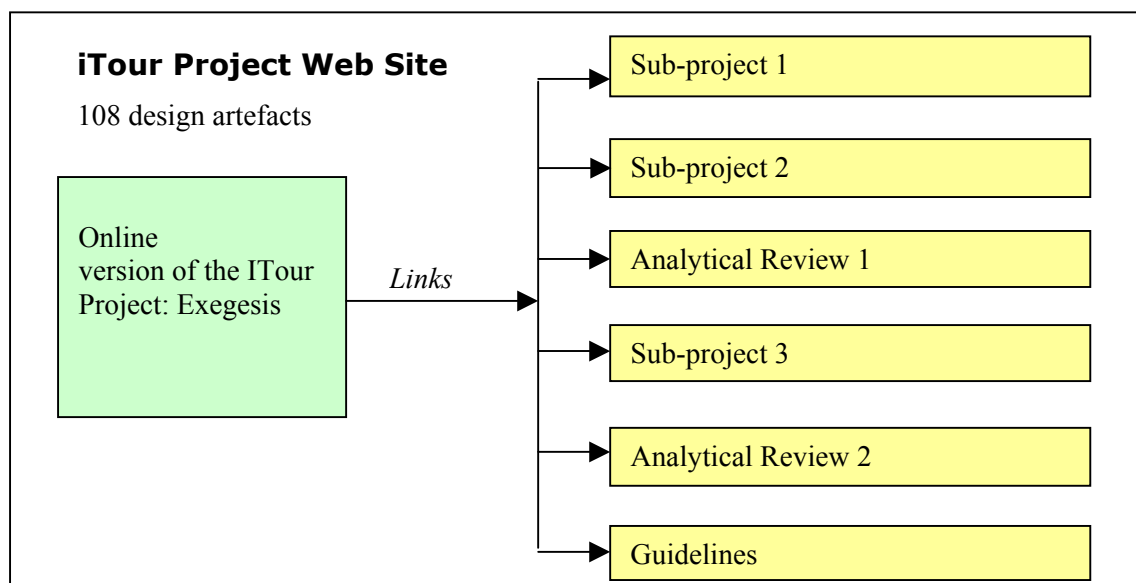


Figure 1: iTour Project Web Site and Exegesis relationship

Viewing the iTour Project through the Exegesis

The Exegesis takes you on a journey through the iTour product development. Whenever you see the Instructions box below, select the link to display the content in a separate window. If you are reading the paper version, the instructions below contain steps describing how to find the examples.

Instructions	To find the Sub-project 1 description, go to the iTour Project web site then select Sub-project 1 followed by Project description .
---------------------	--

Figure 2: Instruction box example

Ensure that you do not move the Exegesis to another directory or move the content without the Exegesis, otherwise the links will not work. Ensure that the Exegesis is running within Acrobat Reader and not a web browser or the links may not work.

Instructions

The iTour Project content and examples are available on both CD and the Internet.

CD

1. Insert the CD and wait a few seconds.

Result: The iTour Project Exegesis page displays.

Note: If it does not, then run **/autorun** to call up an introductory PDF page or run **index.htm** to call up the iTour project web site.

WWW

1. Go to <http://www.dlsweb.rmit.edu.au/pdsc/scm/>

User id: scmguest

Password: RMIT2005

Result: The iTour Project home page displays.

2. To take a tour of the project, select **iTour**.
3. To view the Exegesis, select **Exegesis**.

Note: If you wish to view the Exegesis and open the sub-documents so you can look at both at the same time, I recommend opening the Exegesis using Adobe Acrobat Reader. To do this run **/autorun**.

Preferred system requirements

The project has been tested using the system requirements below:

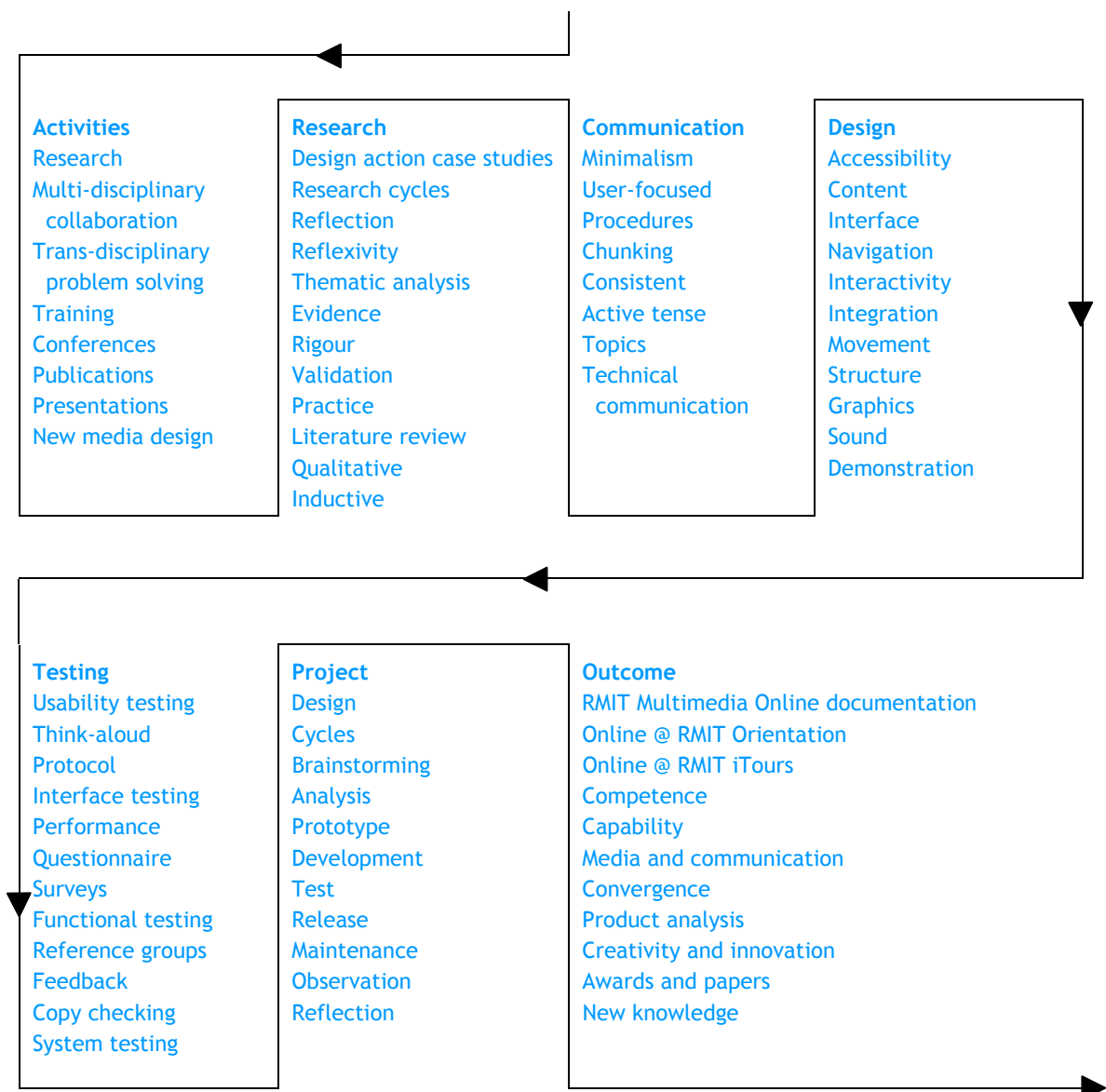
Table 1: Preferred system requirements

Platform	Windows 2000 Windows XP World Wide Web
Display resolution	1152 by 864 pixels
Medium	CD URL (WWW entry): http://www.dlsweb.rmit.edu.au/pdsc/scm/
Preferred browser	Internet Explorer 6
Software	Flash Version: Flash 6 and 7 Adobe Reader
Sound	Speakers to hear voice in Sub-project 2 and mouse-clicks in Sub-project 3

Foreword

The research emerged from my own curiosity about new media. Involved in technical writing since 1981, I had significant experience in document design but not new media. The problem was that I wanted to include new media within my online documents but did not know how. The iTour PhD Project describes a personal journey from technical writer to iTour designer and producer. The journey and evidence of the journey is recorded within the Exegesis, the iTour Project web site, and my project archives. The rest lives within me.

Along the way I experienced ...



The personal journey of this project is conveyed by referring to myself throughout the Exegesis. This approach is not unique within formal research and it allows the reader to engage with my incremental thinking (see Peterson 2004). Literature is often cited

chronologically, also suggesting a time continuum and the emergent nature of research in the field.

My journey started with the literature search and then progressed through six activities spanning design, testing and analysis. These activities included designing and testing documentation with animation and iTours, in addition to analysing other iTours. The research resulted in the creation and storage of 108 artefacts in the iTour Project web site. It was only through creating such a sizeable collection and exploring the design possibilities in such detail that I could produce, with authority, a set of guidelines for other designers.

The iTour Project web site houses the durable record of the project. The activities and artefacts constitute the project component of the PhD. The web site is the design artefact repository for the research project; the web site itself is not the project. My focus has been on the artefacts themselves; for example, one artefact, the Online @ RMIT Orientation, took six months to prepare. Thus, the web site is a ‘container’ for the artefacts and forms the webbing between the artefacts so visitors can move around it.

As far as the PhD project is concerned, the iTour Project web site is finished and supports the Exegesis completely. However, the web site itself, like the RMIT iTour Sub-project 3, is a work in progress. The iTour Project has been in production since 2001 and continues to be reviewed and improved. The iTour Project web site is scheduled for release to the public in 2006.

I will now introduce the research by defining the broad field of study on which the research is based, including preliminary discussion of the concepts of ‘technical communication’ and ‘iTours’. This is followed by an initial synopsis of literature in the parent fields of technical communication and new media to provide context. A PhD by project is then defined, as this is a relatively new form of PhD research. Finally, a glossary of terms is presented. All this will set the scene for the Introduction chapter.

Background

Overall Field

Technical writing or technical communication encompasses both content and mode of delivery. It goes further; contextual and interactive interpretation is intrinsic to that communication.

Hargis et al. (2004) define technical information as “information about a technical subject, usually for a particular audience and for a stated purpose” (p.1). Technical communication of information “accommodates technology to the user” (Dobrin 1983, p.242) and is required “to

help an audience understand a subject or carry out a task” (Markel 2000, p.4). It involves “creating, designing, and transmitting technical information so that people can understand it safely, effectively, and efficiently” (ibid.) and provides information that is useful, but not necessarily everything that is known (Dobrin 1983).

Traditionally, the positivist viewpoint of communication has dominated the definition of technical writing. Technical communication was explained as a process in which a writer uses a medium such as text to pass information to the reader (Miller 1979; Robinson 2001). With this positivist view, language was universal and could only have one definition (Dobrin 1983); audience was viewed in terms of levels (Miller 1979) e.g. beginner, advanced; and another emphasis was on style, organisation and tone (ibid.)

Within the contemporary social constructionist view, technical communication does not reside in the text or media itself but is socially constructed by the user and their community. It exists “only in the minds of communicators who produce documents and readers who use documents...a text can have as many meanings as it has readers” (Redish 1993, p.20). Miller (1979) adds that “reality cannot be separated from our knowledge of it; knowledge cannot be separated from the knower; the knower cannot be separated from a community” (p.615).

In the social constructionist view of technical communication, social factors play an important role in how writers write and how readers interpret a text. Robinson (2001) describes four factors:

1. Social forces influence the writer.

Examples of these social forces include but are not limited to the writer’s own history, knowledge, community in which they live and work, and current social context. Understanding of this informs the writer so they can adjust their writing to suit the audience. In this way there is a greater chance that the writer will more accurately and clearly convey a message so that it will be understood as intended.

2. Social forces influence the reader.

These social forces are similar to that of the writer and can include their history, knowledge, community and current social context. Also at work are the reader’s own “goals, assumptions and context” (Flower 1988, p.540). Fish (1989) says that the reader’s community plays an enormous role as the interpretation of the text’s meaning occurs in the context of their ‘interpretive community’ rather than within the individual reader, or the text itself (p.83). ‘Interpretive community’ is defined as a group with a shared point of view and way of organising and categorising experience

(ibid.). Understanding the social forces at work on the reader improves the likelihood that the author will take steps to increase the chance of being understood.

3. The writer's perception of the reader influences the writer.

The writer must have an audience for whom to write. A social constructionist approach to writing is not to write to an imaginary audience but to communicate with a live audience, for example, via peer-reviewing articles. In this way they can communicate with 'real readers' (Cooper 1989, p.11) by sending them text, asking for feedback, and revising the text. Another way to determine the meaning is through think-aloud protocols (Redish 1993; Boren and Ramey 2000) where the reader provides direct feedback to the writer.

4. Writers should remember that the reader's notion of the author and the author's intentions can shape the reader's interpretation of the writing.

Therefore the writer should take into account the "reader's knowledge, expectations, and styles by using techniques that have been shown to match the way that readers approach documents" (Redish 1993, p.32). As in the previous point, it is important that the writer should know the people for whom they write and follow a peer-review approach (Blakeslee 1993). This approach informs the writer that the writing is received as anticipated by the author; if not, the author can apply the feedback and revise.

(see Robinson 2001)

'Technical communication' as used in this Exegesis exists within a social context and so is strongly influenced by the social constructionist view. This includes both the development of the communication with significant audience involvement and interaction, and the resulting iTour content and configuration. My view is that, in general and in my project, the interface is more appropriate for the audience than if a social constructionist approach were not taken (see Farkas 1999).

Some examples of technical communication include help systems, operating instructions, wizards, web-based content, guided tours, messages, reference manuals, and business reports. However, examples of technical communication are not limited to these and can include "web-based education, strategic management of information, communicating science and technology in the public arena, digital libraries, international adoption of information and communication technology, multimedia tools for international communication, and outcomes assessment of learning" (Haselkorn et al. 2003).

Building upon this definition of technical communication, I now introduce another form of technical communication, the online animated tour referred to throughout this Exegesis as the iTour.

iTours are interactive animated tours that can be used to describe the concepts behind, as well as demonstrate, the features and functionality of an object. These iTours provide a “brief demonstration” (Carliner 2002, p.4) or lead the user through the underlying software’s displays and menus while pointing out how these might be used (Horton 1994). In other words, in this Exegesis the online animated tour is used to support users wanting to read “to do” (Redish 1988, p.289). The iTour is used to introduce a novice user to a software application and guide the user through the application.

These tours can also be known as animated software demonstrations, interactive demonstrations, visual FAQs (frequently asked questions), Flash demonstrations, Shockwave demonstrations, animated presentations, software simulations, or Viewlets. They are generally referred to as **iTours** throughout this project and Exegesis.

Some features of iTours are:

- Screen captures from the software to provide a visual display of the interface;
- Text boxes in which a description of the current action or other useful information is placed; and
- Auditory elements such as voice-overs to describe an activity, or a mouse-click noise.

The iTours in this research have been used as a tour in two ways: the first is by showing the features of a product; and the second is by introducing people to a product via procedural ‘how to use’ demonstrations. When starting the research I chose the term ‘iTour’ as it encompassed both a tour and journey through the features of a product, as well as a series of performances. iTour can mean both ‘internet tour’ and ‘interactive tour’. There are times during the development when I have vacillated between ‘iDemo’ and ‘iProcedure’, and more recently ‘Docalet’, which also have their strengths and weaknesses as names. I decided on ‘iTour’ as my research at RMIT University is known by that name and has an established identity.

For further information and examples of iTours, see ‘iTour’ on page xviii in the Glossary.

The concept of a tour in new media or user documentation is not new. Bush (1945) first referred to trails through a memex. This concept evolved into a guided tour with Notecards (Trigg 1988), which was developed during 1985 to 1988 at Xerox Parc; it also developed into a scripted path (Zellweger 1989) through hypertext. Researchers in hypermedia and online documentation refer to the concept of an online guided tour (see Balasubramanian 1993;

Horton 1994; Nielsen 1995b; Carliner 2002). However, specific information and examples are not readily available on the development of iTours; hence the requirement for this research on iTour design and testing (see Plaisant and Shneiderman 2005).

Previous Research

The search for design guidelines, from the first parent field of technical communication, uncovered literature on hypertext design; online documentation design; document structure and navigation via links and nodes; convergence; web usability design; and multimedia, including animation and web design. Initially the search did not, however, find guidelines on designing or testing online tours. (See White 1988; Herrstrom and Massey 1989; Horn 1989; Shneiderman 1989; Shneiderman and Kearsley 1989; Brockman 1990; Carroll 1990; Nielsen 1990; Rojas-Fernandez 1991; Weiss 1991; Landow 1992; Dowhal, Bist, Kohlmann, Musker and Rogers 1993; Price and Korman 1993; Horton 1994; Farkas 1995; Horton 1995; Kemnitz, Jeansonne, Kim, Pirie, Shafer, Walker and Zambon 1995; Nielsen 1995b; Boggan, Farkas and Welinske 1996; Siegel 1996; Snyder 1996; Hackos and Stevens 1997; Heba 1997b; Tufte 1997; Barker 1998; Carroll 1998; Kostelnick and Roberts 1998; Maybury and Wahlster 1998; Redish 1998; Rosenbaum and Bugental 1998; Lynch and Horton 1999; Farkas and Farkas 2000; Nielsen 2000a; McMillan and Hobson 2001; Quesenbery 2001; Farkas and Farkas 2002; Alfred 2003; Gregory 2004.)

There was also literature available on web usability design and testing, which was not restricted to a particular genre of online material (see Nielsen 1994; Rubin 1994; Dumas and Redish 1999; Hughes 1999; Krug 2000; Nielsen 2000a; Barnum 2002; Koyani, Bailey and Nall 2004).

Well-known technical communication researchers have started to discuss simulations and interactive animation for documentation. Both Carliner (2004) and Horton (2004) have held workshops in these fields; however, the availability of this information was limited to the workshops. Plaisant and Shneiderman will present a paper on Guidelines for Recorded Demonstrations in September 2005 at the Institute of Electrical and Electronics Engineers (IEEE) Symposium on Visual Languages and Human-Centric Computing, in Dallas, Texas.

“Essentials of RoboDemo 5: eLearning Edition” focuses on how to use RoboDemo, a third-party tool that can be used to design iTours (Siegel 2003). “Macromedia Captivate for Windows” focuses on how to use the next version of RoboDemo called Macromedia (Green 2004). These texts do not, however, provide design guidelines for developing animated tours.

A search beyond technical communication, in the other parent field of new media, found publications available on multimedia, cyberspace research, and working with animation and

sound online (see White 1988; Apple Computer Inc. 1994; Gloor 1997; Chan, Baker and Williamson 2000; Chapman and Chapman 2000; Dodge and Kitchin 2000; Hughes 2000; Dodge and Kitchin 2001; Elin 2001; Elsom-Cook 2001; Stern and Lettieri 2001; England and Finney 2002a and b; Thissen 2003; Barfield 2004; Bennett 2005). General design information was available, but was not directed towards the technical writer and not initially focused on online guided tours until very recently (see Plaisant and Shneiderman 2005).

Furthermore, in 2000, de Jong and Geest stated that web design was so novel that almost any solution was a non-standard solution, and most attention had focused on the technical development rather than on its character as a means of communication. Elsom-Cook (2001) also said that the interactive multimedia field was in its early stages of development and people only now were in “the process of creating the specialism of research, design and development” (p.xi). Considerable discussion indicates that there are standards in web design and multimedia (see Siegel 1996; Lynch and Horton 1999; W3C 1999; de Jong and van der Geest 2000; Farkas and Farkas 2000, Nielsen 2000a; Spyridakis 2000; Veen 2001; CITA 2002; Farkas and Farkas 2002; Sklar 2003; Thissen 2003; Zeldman 2003; Bennett 2005), but that the relatively recent introduction of web design and multimedia is one reason for the paucity of guidelines in the area of iTours.

At the time of writing, there were few guidelines from technical writers or interactive multimedia designers on designing interactive online guided tours. As such, the technical writing community do not yet have a sufficient body of definitive design models that can be applied to the interactive animated online tour. This significant gap is addressed by my PhD research on iTour design.

About PhD projects

PhD by project is a relatively new academic degree and is not offered at all universities. Researchers in the Department of Design and Technology at Loughborough University, United Kingdom (U.K.), define a practice-based PhD that focuses on design as one that:

- Contains “at its heart a contribution to knowledge as well as design excellence”;
- Embodies “new technology, principles or design methods and, as such, contributes to what is known about how that kind of product can be designed and how it can operate”;
- Reports and reflects on the product specification and how the idea for the product was originally conceived;
- Ideally showcases products that have gone into production so the significance is measured by “the places in which the product receives attention”; and

- “Where possible, the success and impact of the final artefact (and of the preceding design process) should be measured.”

(Norman, Heath and Pedgeley 2000).

The U.K. Council for Graduate Education study of what constitutes practice-based doctorates, in the creative and performing arts and design faculties at forty-five universities, adds that:

- “The student must demonstrate a critical knowledge of the research methods appropriate to the field of study” (Frayling 1997, p.9); and
- There is a submission that is subject to an examination by appropriate assessors (ibid.).

PhD research differs from the work of a practitioner who designs and develops new media. Where an artist or designer can simply present their end-product, and not provide explanation, the “academic art and design researcher is obliged also to map for his or her peers the route by which they arrived at that product” (Newbury 1996, p.15).

These ideas (Newbury 1996; Frayling 1997; Norman et al. 2000) underpin my approach to this project, which is presented within both practical and theoretical frameworks of methodology. In addition, the research itself is situated within both practice and theory relevant to the field.

Glossary

Key terms used throughout this Exegesis are now defined:

Action research follows cycles of planning, implementing, and observing change; reflecting on the change; and re-planning for the next change. In this form of research, the researcher is immersed in the research (Reason 1994). During and through the cyclical action, knowledge is revealed to the researcher and the participants (see Lewin 1947a and b; Trist 1976; Carr and Kemmis 1986; Patton 1990; Kemmis and Wilkinson 1998; Dick 1999).

Animated means that animation was used to make an online object appear to move.

Case study is empirical enquiry in which one studies “a few cases in great detail over time” (Neuman 2003, p.530) to investigate “a contemporary phenomenon within its real-life context” (Yin 2003, p.13). It involves systematically looking at what is happening, collecting data, analysing information, and reporting the results (Davey 1991) and relies on “multiple sources of evidence, with data needing to converge in a triangulating fashion” as another result (Yin 2003, p.14).

Design action case study is a hybrid research approach where design research and action research are blended, and knowledge is situated within and derived from a case study.

In a design action case study, the researcher can both observe and participate in the design both directly or with a team working through a cycle of design phases (planning, developing, implementing, observing and reflecting) called PDIOR. On page 170, steps within each phase of the action cycle have been specified to suit design, in particular iTour design. The steps include activities such as interface and content design; design through prototyping; and usability testing.

As with the case study approach (see Yin 1994), the researcher uses the design action case study to focus on one or a small number of designs, using multiple sources of evidence. Further, as advocated by Gregory (1966) for case studies, the researcher employs a collection and reporting process suited to each design action case study, thereby adopting a methodical approach. This approach results in improved capacity for personal interpretation and subsequent dissemination of findings.

Design action research is a combination of design research and action research. It is the study of design through designing as well as through studying the use and performance of designed objects, either directly (doing the activity oneself, or with a team), or through analysing other researchers' and designers' work. The researcher is immersed in the design process, which follows a cyclical pattern of planning, implementing, and observing change; reflecting on the change; and re-planning for the next change. The output is both creating design and adding to the knowledge base of design. (See Carr and Kemmis 1986; Patton 1990; Schön 1991; Frayling 1993; Margolin and Buchanan 1995; Dick 1999; Puroo 2002; Rossi and Sein 2003; Vaishnavi and Kuechler 2004.)

Design research in this PhD refers to a type of research methodology in which the research questions are addressed through design (Norman et al. 2000). This mode of enquiry resembles action research in that it uses design cycles similar to action research cycles; it requires reflective practice to deal with situations that are uncertain, unstable, and unique (Schön 1991); and the researcher participates in the situation under study, in order to make change (see Jacques and Powell 1981; Frayling 1993; Cross 2000; Gregg, Kulkarni and Vinze 2001; Puroo 2002; Rossi and Sein 2003; Vaishnavi and Kuechler 2004). Design research also studies the use and performance of design objects to improve them (Vaishnavi and Kuechler 2004), both directly and through the work of other researchers.

DLS Team is the Distributed Learning System Team who designed and developed RMIT University's online learning platform called Online @ RMIT.

Effective means to produce “the intended or expected result” as defined by the Macquarie Dictionary (2005) which, in interactive online documentation, is communicating information to the audience in a form that is usable. When this term ‘effective’ is applied to communication, it means determining and providing answers to the complex problems of the real world (Albers 2005).

Heuristics refer to “all the sets of process guides, principles, criteria, tips and tricks, and guidelines” (de Jong and van der Geest 2000).

Hypermedia is hypertext modules containing text, animation, sound, video and other media (Chapman and Chapman 2000). These modules are stored electronically and are accessed by electronic links between modules (Horton 1994). Hypermedia can be used to describe a page of interactive online documentation or any interactive web page; for example, a page of advertising.

Hypertext is text-based documents with links on the Internet.

Interactive multimedia means multimedia with the property of interactivity, sometimes referred to as an ‘Interactive’.

Interactivity is the property of any medium that responds dynamically to user control (Bonime and Pohlman 1998). In other words, the user “can interact with the system and through that interaction influence the behaviour of the system” (Barfield 2004, p.7). Even simply being able to navigate a document implies interactivity (Guay 1995). Although one can argue that recent online documentation is interactive, because one can interact with it by virtue of clicking on the hyperlinks or other interactive parts of the screen, the inclusion of new media enhances the interactivity. For example, readers can stop and replay video segments, view animations repeatedly, or even click on parts of a video or animation to jump to other related information.

iTour is a specific form of documentation that provides a walk-through, orientation or guided tour of a product or a set of processes, using animated sequences. iTours are both interactive and animated, and can be used to describe the concepts behind, as well as demonstrate, the features and functionality of an object.

In this research, use of the term 'iTour' refers to introducing a novice user to a software application, although an iTour does not have to be limited to demonstrating software. iTours are designed to be brief, and lead a user through the underlying software's displays and menus while pointing out how these might be used (Horton 1994; Carliner 2002).

Some features of iTours are: screen captures from the software to provide a visual display of the interface; text boxes in which a description of the current action, or other useful

information, is placed; auditory elements such as voice-overs to describe an activity or a mouse-click noise; visual elements such as a small flash graphically representing the mouse click; highlights on important sections of the screen; and mouse or cursor movements to demonstrate where the user should move their mouse.

For navigation, iTours have a navigation control panel through which the user can move around the screen, stop, start, rewind and move ahead within the iTour, and exit when ready. There should be orienting text describing both the iTour and any special instructions required.

These tours can also be known as animated software demonstrations, interactive demonstrations, visual FAQs (frequently asked questions), Flash demonstrations, Shockwave demonstrations, animated presentations, software simulations, or Viewlets. They are generally referred to as **iTours** throughout this project and Exegesis.

An iTour can mean both 'internet tour' and 'interactive tour'. For some examples, the following table includes pages that link to iTours:

Table 2: iTour examples

Location	URL
RMIT University	http://www.rmit.edu.au/Online/educationOnline/tour Select one of the iTours on the page.
Questionmark Perception	http://www.questionmark.com/uk/learningcafe/perception.htm Select a tool then a feature tour.
WebBoard	http://www.akiva.com/products/webboard/prodinfo/flashdemo.cfm Select Begin tour >> to launch the tour.
Guided tour of WebCT vista	http://gromit.webct.com/vistatour/ A demonstration should automatically play on this page.
Macromedia Captivate	http://www.macromedia.com/software/captivate/ Select Take a tour of features to launch the tour.
Macromedia Flash “What's new in Flash MX 2004?”	http://www.macromedia.com/software/flash/?promoid=home_prod_flash_082403 Select View the feature tour to launch the tour.
PC Show and Tell	www.pcshowandtell.com Select a tour from the home page under See for yourself!
Qarbon Viewlet™	www.qarbon.com Select Demos and find a Viewlet.
Camtasia TechSmith Corporation	http://www.techsmith.com/products/studio/default.asp There should be a demonstration on the page.

URLs validated December 15, 2005

Learning Hub is the portal through which RMIT students and staff access their program and course (subject) material, as well as link to the online teaching and learning programs.

Multimedia encompasses both analogue and digital media (Borda 2004), and uses “a mixture of text, graphics, animation, video, sound, music and perhaps other media” (Horton 1994, p.4). It can be as simple as two of the previous media or as complex as many of them combined.

When my research started in 1997, ‘multimedia’ was the term in use. Over time, the term ‘new media’ has increased in popularity; however, two meanings have emerged for ‘new media’ among practitioners and researchers. These interpretations are explored further under ‘new media’.

Both terms ‘multimedia’ and ‘new media’ are used in this research. I interchange the terms.

Navigation as applied in this research assists people move through the media object or web site helping the user to understand where they are, where they have been and where they can go (Nielsen 2000a).

New media “= multimedia + the web + more” (Barfield 2004, p.xiii). It is typically associated with “digital technologies and electronic multimedia, and by nature of its usages is inherently interactive” (Borda 2004). Interactivity means that one “can choose elements to display or [choose] which parts to follow” (Manovich 2001). This is different from the “old media” or pre-digitised media that displayed in a fixed order (ibid.). It is this newer definition that is applied to my research.

There is another view that new media “emphasizes the experience of these works as ‘new’ and different from existing forms of entertainment and instruction” (Rockwell and Mactavish 2004, p.110). This is not the definition that is applied to my research.

Online means on a computer, network, Intranet or the Internet.

Online @ RMIT is the RMIT online teaching and learning platform.

Online animated tours (see **iTour**)

Online documentation is computer-based documentation. Some examples are operating instructions, reference manuals, product design manuals, online tours, business reports, help systems, wizards and iTours.

Technical communication of information “accommodates technology to the user” (Dobrin 1983, p.242) and is required “to help an audience understand a subject or carry out a task” (Markel 2000, p.4). It involves “creating, designing, and transmitting technical information so that people can understand it safely, effectively, and efficiently” (ibid.) and provides information that is useful, but not necessarily everything that is known (Dobrin 1983).

Some examples of technical communication include help systems, operating instructions, wizards, web-based content, guided tours, messages, reference manuals, business reports, and iTours. However, examples of technical communication are not limited to these and can include “web-based education, strategic management of information, communicating science and technology in the public arena, digital libraries, international adoption of information and communication technology, multimedia tools for international communication, and outcomes assessment of learning” (Haselkorn et al. 2003).

Technical information means “information about a technical subject, usually for a particular audience and for a stated purpose” (Hargis et al. 2004, p.1).

Technical writing is the form of writing used to produce technical communication.

Tour (see **iTour**)

Traditional documentation is a term used in this research to describe text- and graphics-based online or paper-based documentation.

Usable, within this project and Exegesis, means documentation that:

1. Provides the information the user requires;
2. Communicates effectively; is readable and understandable;
3. Is time considerate and not running too quickly or too slowly;
4. Ensures bandwidth issues are transparent;
5. Ensures users can find the information they require quickly and easily;
6. Contains an appropriate level of interactivity, not too much or too little, so that there is no control;
7. Has consistent structure, navigation, interactivity, and interface;
8. Is appealing to the users.

(Horton 1994)

and

9. Is not frustrating

(Schofield and Flute 1997).

1 Introduction

The iTour Project was an empirical study of the design of online interactive animated tours (iTours). The outcome of the research is encapsulated in a web site that binds the artefacts of the design sub-projects with a set of Guidelines. These Guidelines form a conceptual, structural and operational framework (see Peterson 2004) for iTour designers, and draw on the knowledge established while designing and testing iTours, analysing third-party iTours, and researching comparative fields. These include the parent fields of technical communication and new media, as well as associated fields of web, usability, and software design. The Guidelines, in conjunction with the knowledge base, were developed to facilitate effective communication through iTours.

In this first chapter I present the aim, objectives and questions of my research, then explain the rationale and benefits. This will be followed by discussion of the research approach; project description, focus and scope; influences on the research; and ethical considerations.

1.1 Research aim and objectives

The aim of the research was to establish a knowledge base encompassing a practical and theoretical framework, to support technical communicators and new media designers who develop iTours.

The key objectives of this research were to understand the features of effective iTours; to explore the processes and techniques of designing effective iTours; and to establish new praxis in new media design for technical communication.

This research was not about pedagogical or instructional design, nor did it investigate how people learn. The iTour itself is a set of animated sequences with or without sound used to guide a user through software, or the iTour shows the user how to move through a portion of cyberspace achieving specific goals. An iTour may be used as the documentation component of a tutorial; however, as user documentation is not a training guide, the online tour is not a tutorial. For a more detailed definition of an iTour, refer to page xviii.

The project objectives were to produce:

1. A literature review of technical communication focusing on interactive online documentation design and new media design, to find examples of guidelines if they exist;
2. Sets of animated online tours that have been designed, developed into a finished product, and tested to determine their effectiveness;

3. A set of guidelines for technical communicators to use as a reference for designing and testing interactive online tours. These guidelines would draw on experience with designing and testing the iTours; ongoing literature search; analysis of other animated documentation; and knowledge acquired from attending courses and conferences on appropriate themes;
4. A list of issues that is different in designing tours from other new media or traditional text-based design.

1.2 Research questions

The main research question that directed my exploration of the design of iTours was:

What processes and techniques are required to design effective interactive animated tours?

Processes are defined as “a course of action or a procedure” (The Concise Oxford Dictionary 1995, p.1090) and techniques as “details, methods” (ibid., p.1430).

Within the overarching research question, the following questions underpinned the research:

1. **How do you design effective online tours?**
2. **How can online tour effectiveness be tested?**
3. **What issues are different in designing tours versus other new media design or traditional text-based user document design?**

1.3 Research rationale

Initially, I searched for other doctoral research in the area of new media and technical communication, particularly in the area of online documentation. A worldwide study (see Rainey 1999) of doctoral research in technical, scientific and business communication, 1989 to 1998, found only three dissertations on the design of online interactive documentation. A PhD graduate survey (see Cook, Thralls and Zachry 2003) was conducted between 1995 and 2000 in professional, technical, and scientific communication at 21 United States (U.S.) universities offering PhD research programs in this field. Of the 189 potential respondents, 97 or 51% responded, of which only eight were involved in visual communication research. This finding of so few researchers in visual and technical communications indicated that there would continue to be a research gap in new media and technical communication.

The gap could mean that this area is not relevant; however, observation of the web reveals that products are available to develop online animated interactive tours such as Qarbon ViewletBuilder, TechSmith Corporation Camtasia and Macromedia Captivate, or pre-built tours are available from PC Show And Tell. There are also many companies designing and using tours such as Blackboard, WebCT, Macromedia, Cisco, Westpac Bank, National Australia Bank, Microsoft, Adobe, and Questionmark, to name a few.

Guidelines are needed for technical communicators to use such products. This was confirmed anecdotally during recent discussions at the Australian Online Documentation Conference, on May 4–6, 2005 (DeLoach, S. to Weiss, A., pers. comm., May 6, 2005). International online documentation trainers from the United Kingdom and the United States confirmed the absence of readily available guidelines in this area. Further, Plaisant and Shneiderman (forthcoming, 2005) say: “although recorded demonstrations (screen capture animations with narration) have become a popular form of instruction for user interfaces, little work has been done to describe guidelines for their design”.

Online communicators require their own design theories that suit online documentation and are not simply theories used in other areas such as from games theory, software development and online learning. Online documentation requires information to be explained quickly, concisely and clearly with a focus on usability. Comprehensive standards, guidelines, and methodologies are required that show technical communicators how to develop a professional way of ‘seeing’ with the alternative media.

1.4 Research benefits

Interactive animated online documentation, with its use of text, images, animation, colour, and sound, in any combination, can provide extremely effective explanations of complex products and processes. If poorly designed, however, it can confuse and annoy the end-user.

This research will benefit technical communicators and iTour designers by supplying an iTour design and testing knowledge base, including definitive iTour design models and guidelines based on award-winning designs. Further benefits for technical communicators and designers are:

1. New knowledge on the design and testing of iTours;
2. New professional practice combining elements of design and testing from a range of fields including online technical documentation, web, new media, software and usability design; and
3. A new design research technique that combines action research with design research.

1.5 Research approach

This project drew from a number of methodologies and approaches to facilitate the research. These will be explored fully in the Methodology chapter, but are introduced here as context for the project.

The project was based on action research integrated with design research to explore the design and testing phases of the three sub-projects, in which online animated documentation was created.

In addition to the development and investigation of design sub-projects, this research created a design framework based on the multi-disciplinary thematic analysis of the products and the results of critical analysis of four comparative designs produced independently of this research.

The success of the research depended on the integration of design and product development factors with the action research. To ensure that this integration was successful, the emergent approach of design research was used to ensure that the action research followed a process sympathetic to design and led to the appropriate outcomes. As such the action research was informed by design research.

Action research is a form of enquiry into practice in which the researcher is immersed in the research (Reason 1994). Action research tends to follow cycles of planning, implementing, and observing change; reflecting on the change; and re-planning for the next change. During and through the cyclical action, knowledge is revealed to the researcher and the participants (see Lewin 1947a; and b; Trist 1976; Carr and Kemmis 1986; Patton 1990; Kemmis and Wilkinson 1998; Dick 1999).

In design research, the research questions are addressed through design (Norman et al. 2000). This mode of enquiry resembles action research in that it uses design cycles similar to action research cycles; it requires reflective practice to deal with situations that are uncertain, unstable, and unique (Schön 1991); and the researcher participates in the situation under study, in order to make change (see Jacques and Powell 1981; Frayling 1993; Cross 2000; Gregg, Kulkarni and Vinze 2001; Puroo 2002; Rossi and Sein 2003; Vaishnavi and Kuechler 2004). Design research also studies the use and performance of design objects to improve them (Vaishnavi and Kuechler 2004).

Further, a case study approach (see Goode and Hatt 1952; Gregory 1966; Stake 1988; Hinnells 1993; Svengren 1993; Stake 1994; Yin 1994; Robson 2002) was used to organise the research resulting from the individual sub-projects. This approach was used to facilitate the study, investigation and collection of knowledge about the design process and so to preserve

the character of the object being studied (see Goode and Hatt 1952). The case study was not the primary research method used.

Action research has previously been combined with case studies and experimental research to produce the ‘action case’ study (Braa 1995; Braa and Vidgen 1995). My project took this approach a step further and identified a new adaptation: the ‘design action case’ study that altered the action case study definition to incorporate design research, which may or may not be experimental.

In addition to the development and analysis of design projects, this research created a design framework based predominantly on thematic analysis of the research. This included analysis of design sub-projects created as part of the research, and the results of critical analysis of independently produced designs. This design framework was influenced by current literature in online technical communication design, information design, new media design, web page design, and HCI (human computer interface) design.

In summary, design action research, as applied in this project, is research into design through designing as well as through studying the use and performance of designed objects, either directly (doing the activity oneself, or with a team), or through analysing other researchers’ and designers’ work.

The researcher is immersed in the design process, which follows a cyclical pattern of planning, implementing, and observing change; reflecting on the change; and re-planning for the next change. The output is both creating design and creating information about design.

Building upon the background provided, I now present a brief description of the project component of the study, including area of focus and delimitation of scope.

1.6 Project description

The focal point of this iTour research was the set of three sub-projects and an analytical review of third-party iTours. This activity plus further literature review informed the development of the Guidelines on iTour designing and testing. The sub-projects and other activities are illustrated in the next figure and then described in the following section.

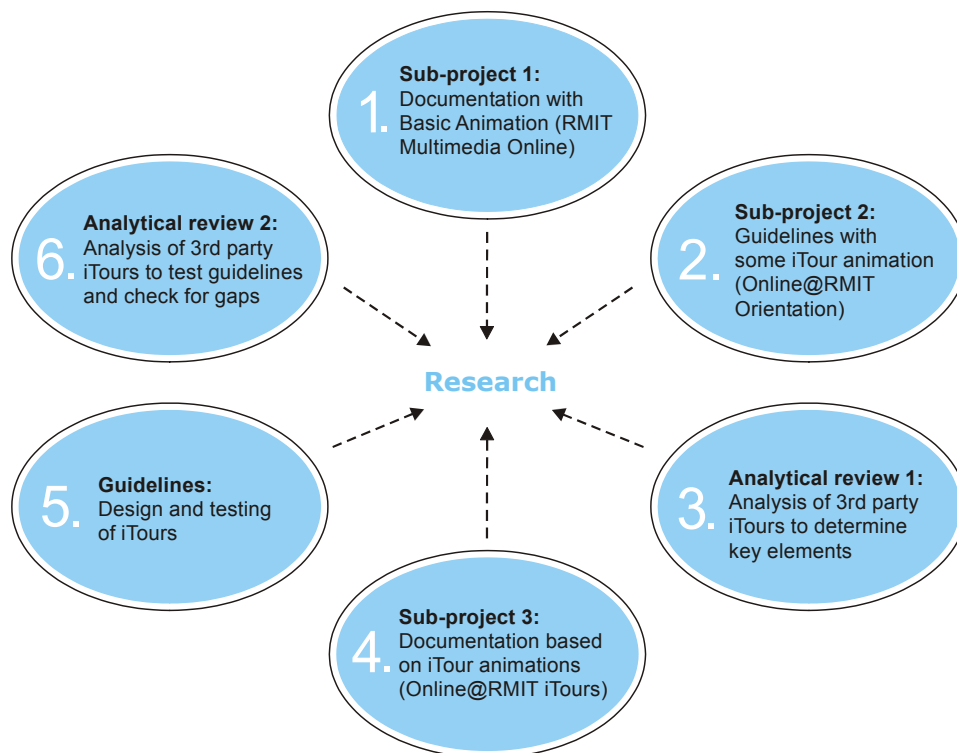


Figure 3: iTour project research activities

1.6.1 Three sub-projects

The three sub-projects provided direct experience in designing iTours and working with other new media designers. The sub-projects grew out of my involvement with online learning, although the research project is not about learning per se. With each sub-project I sought an opportunity initially to provide animated documentation and, over time, iTours. The documentation was provided as support for the online learning system that was an ideal ‘test bed’ for this type of research, as it encouraged experimentation with new media and provided exposure to a large number of staff and students.

The sub-projects included:

Sub-project 1: Documentation with Basic Animation (RMIT Multimedia Online) – 1997.

This first sub-project was an exploration into using animation within documentation. The purpose was to develop online documentation for an online multimedia course. This documentation showed students how to use the software with which the course was taught. The online documentation consisted of online help developed in Hypertext Markup Language (HTML) and animation was used to explain several concepts. The design and development component was undertaken over six weeks; the testing, which was linked to a trial of the whole site with 100 students, required four months.

As iTours were not used in this sub-project, a description of its development is available in the iTour Project web site. This shows the initial development of the design and testing practices used to manage the development of animation within a technical communication project. This sub-project was awarded the First Prize in the 1998 competition for the Australian Society for Technical Communication (Victoria) Technical Writing.

Sub-project 2: Documentation with some iTour animation (Online @ RMIT Orientation) – 1999–2000.

This second sub-project was also exploratory and focused on developing an orientation for online learning at RMIT. The iTour design started to develop within this project. Two of the nineteen sections included iTours to show how to use the software associated with Online @ RMIT; one section used an iTour to show users around the Orientation. The multimedia version product was developed using Macromedia Director and was completed within five months. There was an HTML version but it is not the subject of this research, as it did not use animation in the iTour components.

This sub-project was awarded Third Prize in the 2001 competition for the Australian Society for Technical Communication (Victoria) Technical Writing.

Sub-project 3: Documentation based on iTour animations (Online @ RMIT Orientation) – 2000–2005

This sub-project focused on developing fifteen iTours, which described how to use key aspects of Online @ RMIT and were created using Macromedia Flash. This sub-project made use of both low- and high-fidelity prototypes and usability testing with students. Although the research project has concluded, this sub-project has been ongoing for almost five years.

This sub-project won an Award of Excellence from the Society for Technical Communication (Australia Chapter) – Category: *Demonstrations*. The same project received a second Excellence award for a paper entitled “Controlling an Interactive Animated Guided Tour” in the Society for Technical Communication – Category: *Scholarly/Professional Article*.

1.6.2 Analytical Reviews

The ‘hands-on’ design approach used with the development of the sub-projects was coupled with an analytical review of third-party online animated software tours, to further enrich the sub-projects and the Guidelines. Analysis took place at two different times:

1. Analytical Review 1 was conducted before Sub-project 3 Online @ RMIT iTours commenced. The review involved analysing the composition of two third-party iTours, plus revisiting one produced during Sub-project 2 so the knowledge could be applied to the development of Sub-project 3; and
2. Analytical Review 2 was conducted after the Guidelines were written, to test them and check for gaps. I summarised the Guidelines into a checklist and then reviewed two third-party iTours against this summary. This helped me determine if there were any gaps in the Guidelines.

1.6.3 Guidelines

The final Guidelines were the outcome of an integrative approach to the research in which the elements combined to help answer the guiding questions. This model incorporated the elements of the design sub-projects, literature search, and analytical review of third-party products. The results of the research were then incorporated into a set of heuristics in the form of guidelines.

Guidelines were selected as a method of summarising the research as “heuristics help designers by directing their attention and promoting exploration of the range of options from a particular perspective” (de Jong and van der Geest 2000, p.311). Reading through and using someone else’s research can save time (ibid.).

These iTour Guidelines synthesised studies by many writers over two decades from different fields including technical communication, especially online documentation; new media development; web design; software development; and usability studies (see Simpson 1985; Queipo 1986; Dumas 1988; Redish 1988; Apple Computer Inc. 1989; Shneiderman and Kearsley 1989; McConathy and Doyle 1990; Horn 1991; Rojas-Fernandez 1991; COMLAW 1992; Horton 1994; Nielsen 1994; Rubin 1994; Boggan, Farkas and Welinske 1996; Rubin 1996; Hackos and Stevens 1997; Schofield and Flute 1997; Shneiderman 1998; Constantine and Lockwood 1999; W3C 1999; Boren and Ramey 2000; Chapman and Chapman 2000; Krug 2000; Microsoft 2000b; Spyridakis 2000; Elsom-Cook 2001; Lynch and Horton 2001; PTI 2001; Tognazzini 2001; Barnum 2002; CITA 2002; Farkas and Farkas 2002; HREOC 2002; IMS 2003; Macromedia 2003a; Sklar 2003; Thissen 2003; Barfield 2004; Farkas 2004; Bennett 2005; Shneiderman and Plaisant 2005).

In addition, the Guidelines were based on my empirical research that commenced in 1997. As such, they are intended to provide an inexperienced iTour designer with new perspectives, as well as a clear and rigorous framework. For an experienced designer, the Guidelines may

expand the view of what is possible, or possibly confirm the approach that they were going to take (Krull 1997).

Feedback from industry peers was used to determine the effectiveness of the Guidelines.

1.7 Influences on research

This research, focusing on the design and test of iTours for technical communication purposes, encompassed more than the iTour and included the page or body in which the animation appeared, such as the HTML page, as well as the sequence of web pages on which multiple animations displayed.

At the start of the iTour Project I established the first two research questions in a particular order: “How do you design effective online tours?” followed by “How can online tour effectiveness be tested?” My intention was to establish answers to the questions in the same order: first, focus on understanding and defining the design activities and then second, understand how the iTour effectiveness could be tested.

In the early literature review and Sub-projects 1 and 2, my focus was initially on establishing a design process that would be suitable for iTours. Once the design process had been instituted I increased the focus on testing, establishing a more robust process of checking both the usability and functionality in Sub-project 3 and the Guidelines.

Driving the research was a focus on:

- Standardising the interface of online animated interactive tours;
- Incorporating accessibility guidelines with the other guidelines where possible, so they were integrated and could not be ignored;
- Encouraging use of a minimalist approach (see Carroll 1990; Redish 1998) to the design. This was achieved by designing the documentation so the audience is reading to ‘do’ (see Redish 1988, p.289); structuring the documentation around the tasks; and not describing computer functions apart from real tasks; and
- Establishing best practice and encouraging a combination of strong technical communication design with new media design, given restrictions of the medium, technology, and time limits.

A number of issues and ideas were not the focus of this research, explained as follows:

- This research is not about pedagogy, learning styles or creating tutorials. Online tutorials are similar to iTours but they tend to be longer and may include more background information and drills, so learners can practise what they are learning.

They may also include a way of assessing the user's understanding of what they have learned such as by incorporating a quiz. The comparison between iTours and tutorials is available in the web site:

Instructions	To find an explanation on the difference between iTours and tutorials, go to the iTour Project web site then select Guidelines , followed by Comparison then scroll down to Comparison with online tutorials .
---------------------	--

- Although development of the iTours or changing them from a design into the final product was not a focus of this research, it needed to occur in order to provide an outcome or product for testing, and therefore took up a substantial portion of each sub-project. This project does not focus or describe in depth the actual development; however, it does provide some insights on the development where it informs the design, or provides information on tools used to assist first-time iTour designers.
- This research does not focus specifically on graphic design and so does not investigate areas such as colour design, or environmental design factors; for example, appropriate lighting for use in the user's environment. Such research would require its own project and exegesis.

1.8 Ethical considerations

As this research involved working with humans through usability testing, peer review, and managing staff, there were important ethical considerations. These considerations are described in the relevant sections of the Ethics Application, which are included in Appendix 4: Ethics application, on page 214.

Building upon the framework presented for the research project, the methodology and literature review are presented next as further context for discussion of the sub-projects.

2 Methodology

This project was an empirical inductive study of the design and testing of online interactive animated tours (iTours) to ensure effective communication with this type of media. By re-purposing and intertwining existing methodologies and praxis, new research and design models were formed for iTour design.

The project methodology is presented in two ways. First, I discuss theoretical frameworks within this chapter and incorporate some practical examples from the project. Second, I describe the processes and techniques used, within my discussion on the sub-projects following the literature review.

2.1 Overview

The iTour Project drew from a number of methodologies and approaches to facilitate the research. It was based on action research integrated with design research, embodied in a case study, to analyse and explore the design and testing phases of a series of sub-projects.

Action research has previously been combined with case studies to produce the ‘action case study’ (Braa 1995; Braa and Vidgen 1995). This project identified the ‘design action case study’, expanding the definition of the action case study to incorporate design. The next diagram depicts the research project situated within the three research approaches:

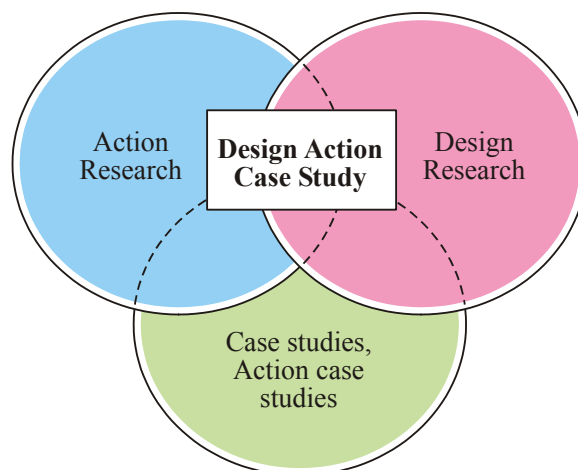


Figure 4: Situating the design action case research methodology

Through the parallel process of designing iTours, and action research activities such as formative and summative evaluation in conjunction with reflective and reflexive practice, I

transcended my own assumptions and underlying extant practices (see Peterson 2004). My research forged new links between technical communication and new media design theory as well as personal practice. This underpinned the establishment of a set of examples and guidelines.

A diagrammatic overview of the research follows.

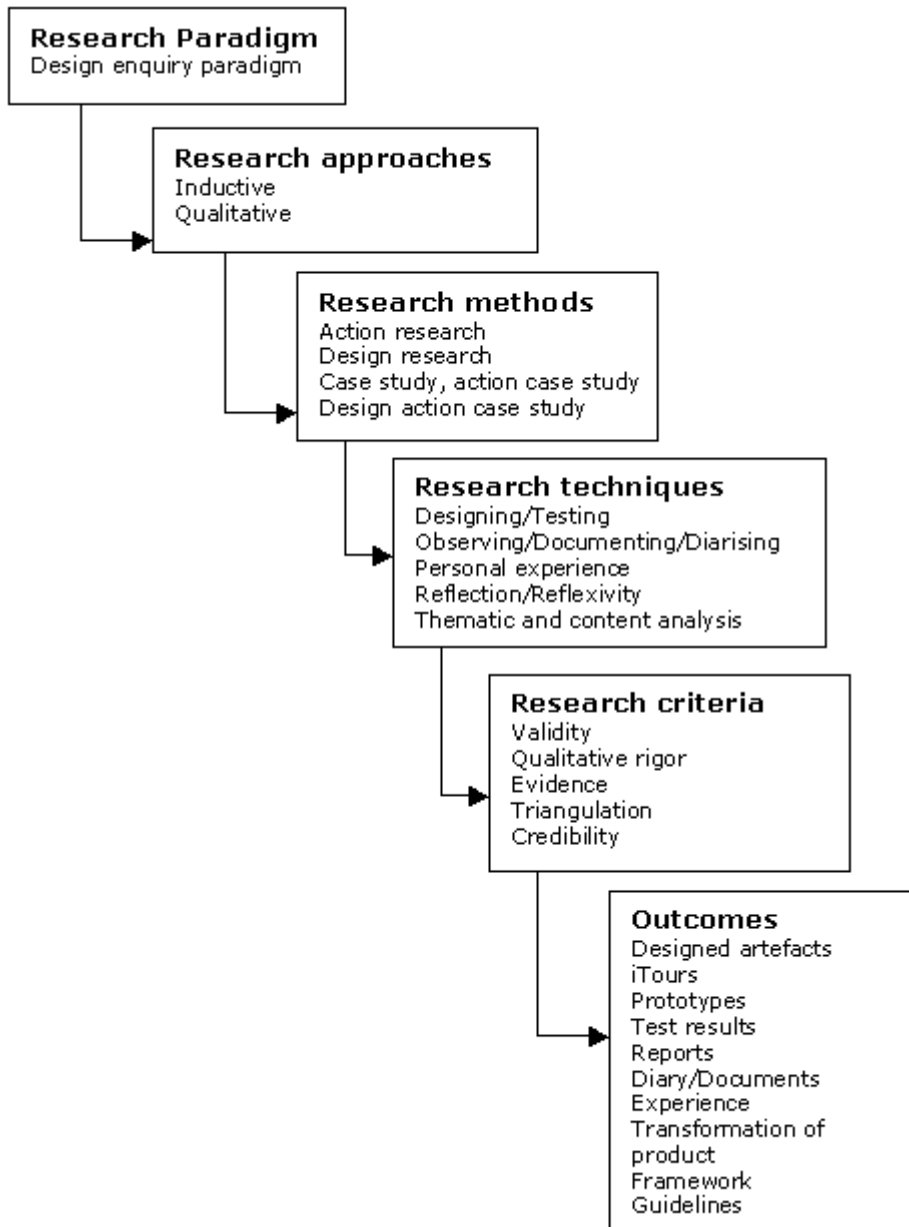


Figure 5: iTour research approach overview

Source: Adapted from Pickard and Dixon (2004)

I brought to this project my experience spanning more than two decades in project management; technical information design; and software design, development, implementation and testing. All of this informed my understanding and growing knowledge about the design and testing of online interactive animations.

As a ‘design action researcher’ combining design research and action research (discussed further in section 2.6), I not only observed the change process but also drove it, and maintained an ongoing relationship with collaborators. My role was one of an action researcher who led the research; recorded notes; collected, produced and analysed the artefacts; and provided knowledge about the design process.

Within the design process my role was one of facilitator, who organised the design, development and test processes. As my knowledge and understanding increased, the intention was that my role would transform from facilitating to managing and actively designing. All through this project my role was one of a ‘student’, learning from each aspect of the project and reflection on the research.

I now present the theoretical frameworks within which my project methodology was situated, with some practical examples included from the project. Details of the practical aspects of my project methodology will be explained further, within discussion of the sub-projects after the literature review.

2.2 Theoretical frameworks—Research background

The positivist quantitative approach, which can also be referred to as “scientific method” or “empirical science” research, is based on the assumption that the world being studied is analogous to the natural world which is “driven by immutable natural laws and mechanisms” (Guba and Lincoln 1994, p.109). This approach focuses on measuring and counting facts and the relationships among variables, and identifying academic research progress with survey research, quantitative modelling and scientific experiment.

In the 1960s, social scientists led the move away from classic research paradigms, as they were not satisfied with the positivist approach to the research of human behaviour including:

- Studying behaviour out of situational context where the meaning and purpose were removed;
- Issues of applying general data to individual cases; and
- The exclusion of the discovery aspect of enquiry

(Guba and Lincoln 1994).

This dissatisfaction resulted in a challenge to the traditional dominance of quantitative methods used in positivist research and led to a growth in interest in qualitative methods. The outcome was a split in the field of research and the rise of an interpretive constructivist qualitative approach (Denzin and Lincoln 1994; Guba and Lincoln 1994; Creswell 2003; Tashakkori and Teddlie 2003).

This newer approach to research followed the position that social science could not hope to find universal truths about human behaviour. It held that realities were constructed by humans in groups and were local, transitory, and contextually based. The abandonment of a search for law-like generalisations was replaced with an emphasis on understanding and interpretation, in which:

The inquirer must elucidate the process of meaning construction and clarify what and how meanings are embodied in the language and actions of social actors.

(Schwandt 1994, p.118).

The qualitative research methodology that grew out of this newer paradigm was characterised by:

- A focus on interactive processes and events rather than variables;
- Researcher involvement in the research;
- Context dependence;
- Thematic over statistical analysis;
- The output being a construct, for example, of social reality or cultural meaning rather than a measurement of objective facts;
- Authenticity over repeatability; and
- The focus on a few cases or subjects rather than on many.

(Mostyn 1985; Denzin and Lincoln 1994; Guba and Lincoln 1994; Tashakkori and Teddlie 1998; Creswell 2003; Neuman 2003.)

2.3 Design research

In the 1960s there was also a move to separate design research from existing design approaches and establish an independent research area. The overall aim of the separation was to develop a body of knowledge that improved understanding of “design processes, applications, methods and contexts”, to define “best practice and workable methods in dealing with design and design related problems” (Cooper and Press 2003); and to analyse the use and performance of designed artefacts to understand, explain and very frequently to improve on the behaviour of aspects of design (Vaishnavi and Kuechler 2004).

The separation of design research as a distinct mode of research is recognised as occurring in London at the 1962 Conference on Design Methods (Simon 1969). This signalled the move to ‘scientise’ design, and from this point researchers worked to establish this new approach (Gregory 1966; Simon 1969; Hubka and Eder 1987).

In the final paper at a second conference on “The Design Method” held in Birmingham in 1965, Gregory sought to promote this concept of ‘design science’.

Design science is concerned with the study, investigation and accumulation of knowledge about the design process and its constituent operations. It aims to collect, organize and improve those aspects of thought and information which are available concerning design, and to specify and carry out research in those areas of design which are likely to be of value to practical designers and design organizations.

(Gregory 1966, p.323).

From this perspective, Simon (1969) made his plea for the development of “a science of design” in the universities: “a body of intellectually tough, analytic, partly formalizable, partly empirical, teachable doctrine about the design process” (p.58).

Schön (1983) rejected this positivist doctrine underlying design science and chose to use a constructivist paradigm.

[Schön] criticised Simon's science of design for being based on approaches to solving well-formed problems, whereas professional practice throughout design and technology and elsewhere has to face and deal with ‘messy, problematic situations’.

(Cross 2002).

Instead of the positivist approach, Schön (1983) proposed to search for “an epistemology of practice implicit in the artistic, intuitive processes which some practitioners do bring to situations of uncertainty, instability, uniqueness, and value conflict”, which he found in “reflective practice” (p.49). A stream of research then followed this path (see Dorst 1995; Akin 1997). This new mode of research focused on:

- “Interpreting the past to discover truth”, rather than intervening and improving the present to realise alternative futures (Purao 2002);
- The mind, meaning and the processes by which meanings are “created, negotiated, sustained and modified” (Schwandt 1994, p.120);
- The output of theories, facts, laws and assertions rather than design artefacts (Purao 2002); and
- Reliance on a paradigm engaged in knowing by observing or participating (Guba and Lincoln 1994) rather than through making (Purao 2002).

During this time a number of design research centres were set up in the United States including at Stanford, Massachusetts Institute of Technology, Palo Alto (Xerox Parc), Carnegie Mellon, and Illinois Institute of Technology. In the United Kingdom, design research grew significantly as government research funding provided new opportunities (Cooper and Press 2003).

While sharing a number of viewpoints with the interpretive constructivist approach and making considerable use of its qualitative methodologies, some design researchers did not think this approach went far enough into supporting design-focused research.

Researchers objecting to the ongoing reliance on the two dominant research modalities, positivist and qualitative, and the associated theoretical and methodological base—which deprived design researchers of other strategies that could better fit design research—strived for further independence.

A movement started then and is currently underway to explore the philosophy best suited to this design research that was originally defined by Frayling (1993) as research about design, through design and for the purposes of design. Other design researchers also support this position (see Jacques and Powell 1981; Frayling 1993; Cross 2000; Norman, Heath and Pedgeley 2000; Gregg, Kulkarni and Vinze 2001; Puroo 2002; Downton 2003; Rossi and Sein 2003; Vaishnavi and Kuechler 2004).

Love (2002) observes that there is a lack of “philosophical foundations” and “sound coherent cross-disciplinary theoretical, epistemological and terminological basis for research and theory making” (p.346). He also asserts that within design research “a unified body of work has, however, not yet emerged in spite of extensive research undertaken over several decades” (ibid., p.345).

Margolin and Buchanan (1995) argue against a unified design philosophy, instead supporting “pluralism” (p.xii) or multiple design philosophies.

Pluralism sustains the ecology of culture, maintaining a gene pool of diverse ideas and methods that enables us to avoid entrapment in dogma by forcing our attention to features of the world that might otherwise be ignored by doctrines that are conceived too narrowly.

(Margolin and Buchanan 1995, p.xii).

In support of multiple design philosophies, my research follows a design enquiry paradigm and draws on the research of Vaishnavi and Kuechler (2004) and Rossi and Sein (2003). The knowledge assumptions underpinning my research are described as follows:

Table 3: Design enquiry paradigm as a reference point

Item	Description	Beliefs
Ontology	Claim about what is knowledge	Design research creates new realities and changes the perception and understanding of reality through design.
Epistemology	How it is known	Knowledge is shaped by incrementally and iteratively creating designs that reveal new understandings of the problem. The design researcher and object they are researching are assumed to be dependent entities. The designer cannot study the object without affecting and being affected by it. Values and bias influence the outcome.
Methodology	How it is done	The individual constructions of design and the knowledge of design can be elicited and refined through interaction between the designer and the object of design. The refinement occurs through an iterative cyclical process of change. The process of design can involve other people, including but not limited to other designers, recipients of the design and other researchers.
Axiology	What is of value	Control; creation; progress (i.e. improvement); understanding (Vaishnavi and Kuechler 2004); relevance (Rossi and Seign 2003).

Source: Adapted from the Table of Basic Beliefs (Metaphysics) of Alternative Inquiry Paradigms (Guba and Lincoln 1994, p.109); influenced by Vaishnavi and Kuechler (2004); Rossi and Seign (2003)

My own research combines both the newer movement of researching through design, with elements of Schön's (1991) approach of observing and participating; viewing other designs, and research on design, to discover the 'truth' (Purao 2002); and creating both artefacts, and facts on the artefacts (ibid.).

Design research as used in this project is a mode of enquiry that resonates with action research, in that it uses cycles of design (Glanville 1998) that are similar to action research cycles (Susman 1983; Carr and Kemmis 1986); requires reflective practice to deal with situations that are uncertain, unstable, and unique (Schön 1991); and the researcher participates in the situation under study, to make change (Patton 1990; Dick 1999). Norman et al. observe that:

Research questions become apparent through designing (i.e., through the investigative techniques that are a characteristic of design activity) and can be addressed through designing (i.e., through the engagement of intentional reactive responses that are a characteristic of design activity).

(Norman et al. 2000).

My research recognises the importance of design research, including its strengths and appropriateness to design thinking. It accepts that design research is a newly acknowledged

area, which has been making progress since the 1960s; but also recognises the controversy over the nature of valid design research, and the tension created by the opposing views amongst designers (Cross 2000; Newbury 2002). Therefore, I have chosen to weave the design research into the fabric of the better-known modality of action research. This pluralism, or combining multiple design approaches, is an ideal premise for design research (see Margolin and Buchanan 1995; Purao 2002; Yen, Woolley and Hsieh 2002).

2.4 Action research

Modern action research originated in two independent research programs with the development of action-based social psychology in the 1940s. Lewin (1947a and b) developed a field-theory version of action research at the University of Michigan Research Center for Group Dynamics in order to study social psychology. The Tavistock Clinic, later Institute, used action research to analyse psychological and social disorders among veterans of battlefields and prisoner-of-war camps. The two developments converged when Lewin joined Tavistock (Trist 1976).

Action research emerged from the social sciences during the 1980s and 1990s as an alternative modality to survey research and quantitative modelling, in which the researcher could participate actively in the research process from the initial design to the final presentation of results and discussion of their action implementations (Whyte, Greenwood and Lazes 1991). There is now significant work in the area of education (Atweh, Kemmis and Weeks 1998) and action research has emerged as a form of research applicable for practical design work (Frayling 1993).

Action research follows cycles of planning, implementing, and observing change; reflecting on the change; and re-planning for the next change. This approach lends a more defined structure to the design research cycles and ensures that observing and reflecting are part of the cycle. It also recognises that during and through the cyclical action, knowledge is revealed to the researcher and the participants (see Carr and Kemmis 1986).

Further, action research is a well-suited methodology where change and intervention are goals (Dick 1999). The advantage of using action research is that, like the cycles of design, action research is cyclical and recursive, resulting in change through a spiral of cycles of critical as well as self-critical action and reflection (Kemmis and Wilkinson 1998).

The diagram below illustrates an action research cycle modified to better suit a design activity. The diagram is adapted from Susman (1983) and influenced by Sless (2000) and my own research:

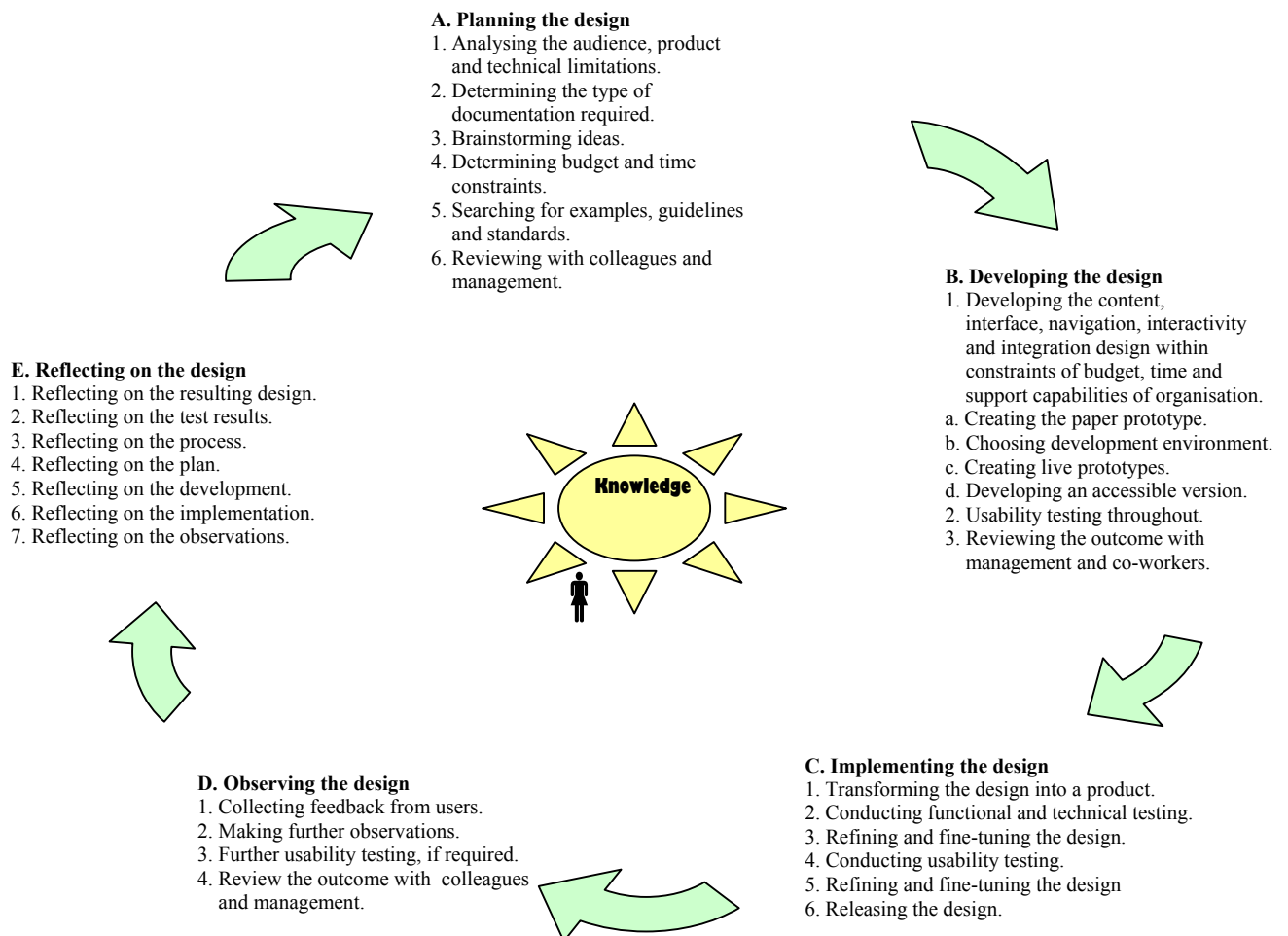


Figure 6: Design action research cycles

Source: Adapted from Susman (1983) and Sless (2000)

I summarise the design action research cycle typical for the first cycle in a project, as follows:

Table 4: Design Action Research Cycle Steps

Step	Description
A	Planning the design, which can include scoping; analysing the audience and product; determining the type of documentation required; and reviewing outcomes with management, peers or co-workers;
B	Developing the design, which includes the content design as well as the interface, navigation, interactivity and integration design. This includes testing the accessibility of the design and refining over multiple interactions;
C	Implementing the design, which includes transforming the design into a product; testing and reviewing the design; and further refining it. It also includes releasing the design;
D	Observing the design, which can be done by further usability testing of the final product; requesting feedback from peers, management, users; checking the level of use; or simply interacting with the final product in situ;
E	Reflecting on changes that can be made to the design to improve it. This includes reflection on the resulting design, test results, process, plan, development, implementation, and observations.
A	In a multi-cyclical design, step E will lead to step A in the next cycle. However, the content of A will differ, as the planning activities will change to reflect that the project is underway and not just starting. For example, in cycle two of the Online @ RMIT iTours, step A: Planning the design included: <ol style="list-style-type: none"> 1. Analysing the results of the usability testing; 2. Determining which changes to implement; 3. Determining how to implement the changes.

Source: Adapted from Susman (1983) and Sless (2000)

Influenced by other development cycle acronyms, I call this cycle the PDIOR (planning, developing, implementing, observing and reflecting) design cycle.

If a project has several cycles, the second and subsequent cycles can simply adjust the design. The planning phase of the second cycle has an element of Fuller's Design Science Planning process in which one defines the problem, defines the preferred state, designs the preferred system, then develops the implementation strategy (Fuller 1992). If the next cycle calls for complete redesign, then the second cycle will again resemble the first cycle.

Within the multi-cyclical project this PhD research incorporates usability testing (Rubin 1994; Krug 2000) as one method of informing the researcher about issues of the current cycle, to provide input into the next action research cycle. Usability testing is discussed further in Usability Test 1 planning, on page 98.

With the spirals of self-reflective cycles the emphasis is not whether the above steps have been followed faithfully, but whether the researcher has "a strong and authentic sense of

development and evolution in their practices, their understandings of their practices, and the situations in which they practice [sic]" (Kemmis and Wilkinson 1998, p.21). This Exegesis demonstrated the development and progression in design practices, and the understanding of the design practices, as well as the situations in which they are practised.

The action research used in this project varied from more traditional action research, as it was not as intensely sociable as action research could be. Dick (2002) supports this variance, saying that although action research can be intensely sociable, it is not always so. At times I collaborated and sought design information from professional designers, and feedback from peers, users and managers in order to benefit the research; at other times I followed a solitary path of designing, implementing and reflecting.

In keeping with action research evaluation as described by Patton:

...design and data collection tend to be more informal, the people in the situation are often directly involved in gathering the information and then studying themselves, and the results are used internally to attack specific problems...

(Patton 1990, p.157).

Patton's (1990) approach describes the data collection for the project, where information was gathered as it was produced and added to the diary or written up in a report; emails were archived and relevant ones copied into a diary or the artefact repository; new versions of products were stored online or on CD; different versions of reports were kept as they progressed; and interesting articles were downloaded or copied and moved to my library for ongoing reference. The data collection became more formal for the usability testing that followed Rubin's (1994) methodology, where specific predefined data were requested or observed, then recorded.

Application of formative and summative evaluation to the action research was integral to the strategy for evaluating projects, and ensured the robustness of each cycle of the project (see Dick 1999). Formative and summative evaluation as defined by Patton are summarised in the next table.

Table 5: Formative and summative evaluation descriptions

Types of Research	Formative evaluation	Summative evaluation
Purpose	Improving an intervention: a program, policy, organization, or product.	Determine effectiveness of human interventions and actions (programs, policies, personnel, products).
Focus of Research	Strengths and weaknesses of the specific program, policy, product, or personnel being studied.	Goals of the intervention.
Desired Results	Recommendations for improvements.	Judgments and generalizations about effective types of interventions and the conditions under which those efforts are effective.
Desired Level of Generalization	Limited to specific setting studied.	All interventions with similar goals.
Key Assumptions	People can and will use information to improve what they're doing.	What works in one place under specified conditions should work elsewhere.
Publication Mode	Oral briefings; conferences; internal report; limited circulation to similar programs, other evaluators.	Evaluation reports for program funders and policymakers, specialized journals.
Standard for Judging	Usefulness to and actual use by intended users in the setting studied.	Generalizability to future efforts and to other programs and policy issues.

Source: Patton (1990, pp.160–161)

In this research, summative evaluation components focused on the extent to which the project was actually implemented. Summative testing was undertaken at the end of each major design action research cycle, and at the end of the project. Artefacts used in the formative and summative evaluation were:

Table 6: Formative and summative evaluation overview

Formative evaluation	Summative evaluation
<ul style="list-style-type: none"> • Emails discussing the progress of the project and changes required; • Project briefings incorporating reflective practice and consolidation of ideas; • Versions of the animations and associated discussions regarding their progress; • Feedback from users, for example in terms of usage statistics; • Project monitoring documents; • Results of usability testing; • Product test results; • Personal journal and memories. 	<ul style="list-style-type: none"> • A published scholarly paper on the research; • Presentation of findings at conference to peers; • Final evaluation from colleagues in the field; • Final project reports; • A peer reviewed set of guidelines supported by project information on designing and testing the iTours; • Acceptance of products (Guidelines, iTours)—were or are they in production and to what extent; i.e. application or adaptation by others.

2.5 Case studies

The use of the case study is an appropriate strategy when research uses one or a small number of cases, which focus on empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence (Yin 1994). The application of the case study was appropriate for this iTour research, as the research sought to explore and define the techniques and processes that were required to design and test effective interactive tours through a small set of sub-projects.

Case studies can be an extremely rigid and planned approach to research; however, the case studies employed in this research were used as a flexible design study, which could still be viewed as a case study (Robson 2002). They were used as a way of organising data so as to preserve the character of the object being studied (see Goode and Hatt 1952) and to study, investigate and collect knowledge about the design process.

As Gregory states, the case studies can be used to:

...collect, organize and improve those aspects of thought and information which are available concerning design, and to specify and carry out research in those areas of design which are likely to be of value to practical designers and design organizations.

(Gregory 1966, p.323).

A case study approach is also useful within a confined or “bounded” system such as the development of an iTour. This type of study emphasises the whole system, and at the same time confines attention to those aspects that are more relevant to the research problem (Stake 1988, p.258). So although each case study involved the development of one iTour from start to finish, the focus was on the design and testing of the iTours.

The case study is a favoured and often used approach in design practice research (Hinnells 1993; Svengren 1993). It also combines well with action research (Stake 1994). The case studies provided the opportunity to develop several iTours, from design to product release. This enabled as holistic an understanding of the subject as possible. Although prototypes themselves could have been tested, I felt the results would be validated more usefully by seeing the development through to completion and releasing the end result for peer review. In this way, the highest level of development and testing would be encouraged. All products resulting from the design have been released to the public. The web site will be released to the public in 2006.

One challenge with the case study approach is how much should be recorded, and over what time period (see Stake 1994). The challenge in this research was to determine what information was relevant to the research, versus what was relevant to the end users who were

the recipients of the results. The outcome unfolded as the research developed. The information for users was recorded on the web site and most of the research relevant information was included in the Exegesis. However, due to the size limitation of the Exegesis, research relevant information has been recorded in some cases on the web site and this will be indicated in the Exegesis.

2.6 Design action case studies

This research drew on aspects of action research and design research combined with case studies. Action research in parallel with case studies has been used by Braa and Vidgen (1995) for Information System Design and subsequently applied by numerous studies including those by Hughes and Wood-Harper (1999) and Stenmark (2000). Yen et al. (2002) applied the action case to art and design research.

As my research depended on the integration of design and product development factors with the action research, the emerging methodology called design research was integrated with action research within the case studies to ensure that the research approach was sympathetic with the design. I referred to this approach as ‘design action case study’ rather than an ‘action case study’, which may be non-design focused such as those studies described by Hughes and Wood-Harper (1999).

As with other modes of design research such as action case study, the design action case study was created to operate at the interface between academic enquiry and design practice to collect and transfer knowledge to other researchers (see Yen et al. 2002). The design action case study is a hybrid research approach where design and action research are blended, and knowledge is situated within and derived from a case study.

In a design action case study, the researcher participates in the design both directly or with a team working through a cycle of design (planning, developing, implementing, observing and reflecting) called PDIOR. The steps within each phase of the action cycle have been specified to suit design, in particular iTour design, and include activities such as interface and content design; design through prototyping; and usability testing.

Each design action case study is an individual study of design where knowledge is collected within the separate case. Then the collection and reporting is established to suit the research and grows out of each design activity.

This research method for design was required not only to observe and understand the design and testing process under study in my project, but also to intervene in and change the process in a way that was sympathetic to the design. The use of action research and action case study,

in parallel to case study and design research, was therefore appropriate. The design action case study was not only focused on the existing process, but also on intended changes which were implemented using an approach sympathetic to the design.

Svengren (1993) suggests a taxonomy, which defines and compares action research and the case study. Yen, Woolley and Hsieh (2002) extend the table to define the ‘action case study’. As illustrated in the following table, I extended the taxonomy further, to situate the ‘design action case study’ within the field:

Table 7: A comparative analysis of four research methods

Areas	Action research	Case study	Action case study	Design action case study
Researchers	Participation	Third-party	Participation	Third-party, researcher sole or participating
Research enquiry	Problem-oriented, might change during the process	Goal-oriented	Goal-oriented, problem-solving	Goal-oriented, problem solving, design-focused
Research process	Flexible, solution-oriented	Pre-planned, some flexibility	Pre-planned, flexible, goal-oriented	Flexible, goal-oriented, design-focused
Dependency on the case	High	Low	High	High
Research objectives	Knowledge and understandings: focus on intended changes	Knowledge and understandings: focus on establishing new knowledge (know how)	Knowledge can be applied to all instances of the same type. It contains mainly general rules	Knowledge and understandings: focus on intended changes and establishing new knowledge (know how) in design for application in other cases
Area of validity	Pieces of knowledge are detached and valid only in one case	Knowledge can be applied in several instances	Knowledge can be applied in several instances of the same type. It contains mainly general rules	Some knowledge can be applied in several instances of design
Reliability	Difficult	Possible	Difficult	Difficult, as no two projects are the same
Intervention by researchers	Allowed and desirable	Not allowed	Allowed and desirable	Allowed and desirable
Analysis concern (pragmatic criterion)	Credibility/consistency and workable for client	Credibility/consistency	Credibility/consistency and workable for other instances	Credibility/consistency and workable for other instances
Mode of presentation	The essential sense of “tacit” knowledge cannot be explained verbally	Tradition. Exemplar. Skill of trade. Many important points of these cannot be presented verbally	The knowledge can be explained as a design model	Exemplar. Skill of trade. May explain some points with a design model or verbal presentation

Source: Adapted from the comparison between action research and case study (Svengren 1993) and the action case study (Yen et al. 2002)

This table suggests that verbal presentation may not be integral to action case study. However, other researchers may disagree (see Peterson 2004).

In summary, the research approach is design enquiry, within which the design action case is used to explore iTour design in a series of sub-projects. The design is also influenced by analytical reviews of third-party iTours; literature reviews; and experience within new media, technical communication, human computer interface (HCI), web, and software design and testing. In the next section I discuss the analytical approach, which is supported by reflection and reflexive critique to draw out design guidelines.

2.7 Data analysis

Inductive analysis starts with detailed observations and moves toward abstract generalisations and ideas. Deductive analysis starts with “abstract logical relations among concepts, then moves towards concrete empirical evidence” (Neuman 2003, p.51). This research started with the detailed observations of the action and design research experiences and progressed towards abstract generalisations, themes and ideas.

The data collected and studied included:

- All reports and project plans associated with each project;
- iTours, progress versions and finished products;
- Results from analytical review of third-party iTours;
- Outcome of usability tests including content analysis of usability studies; and
- Diary, memories and notes on the project.

Analysis of the data was informed by theoretical frameworks drawn from the literature review together with analysis of iTours, both designed as part of this research or from a third party; and analysis of other forms of new media including media object players.

Two different analytical approaches were applied to this research. The predominant approach was thematic analysis, which is the process of recovering structures of meanings that are embodied in a text (see Taylor and Bogdan 1984; Benner 1985; Leininger 1985). It included listing the patterns or themes that were obvious from the collected data; identifying all data that related to these patterns; regrouping the raw data with the pattern; combining and cataloguing patterns into sub-themes; checking the themes with others; building a valid argument for choosing the themes by reading related literature; and then weaving the result into a storyline (see Aronson 1994).

Thematic analysis is a complex and creative process of insightful invention, discovery and disclosure—not a rule-bound process but a free act of “seeing” meaning (Manen 2002). Thematic analysis was ideal for this iTour research as there were multiple texts from various disciplines that discussed possible themes.

Content analysis is a more mechanical process. This type of analysis refers to the systematic application of categorisation rules to content, which culminates in numerical descriptions of the text that can be quantitatively processed and used to make inferences about the data (Berelson 1952; Gerbner, Holsti, Krippendorff, Paisley and Stone 1969; Bauer and Gaskall 2000).

Content analysis is useful for processing large amounts of data as it can quickly impose order and characterise the data. This approach, however, has weaknesses which include easy misinterpretation of information that is out of context; the focus is on frequencies so it can neglect the rare and ignore the absent; and this type of analysis does not always uncover relationships with other units (Bauer 2000).

Rose (2001) adds: “numbers do not translate easily into significance”, which means that a large number of comments in one area does not mean that area is more significant than the others. For example, in my research I found that when researchers discussed development of hypertext with multimedia, their focus was on the structure and links and they ignored the design of the multimedia content. This does not make the design of the former more important than the latter. If anything, it increases the importance of studying the latter, because so little has been said about it.

In my project the inductive analysis included thematic analysis informed by content analysis. The content analysis was applied to the formal usability testing results in the case studies. Thematic analysis was the preferred approach for the development of the Guidelines, as through this analytical approach I developed a sense of the possible topics that should be included.

The next section describes an enquiry approach important to supporting change and improvement within action-based research.

2.8 Reflection and reflexivity

Reflexive enquiry occurs when the practitioner reflects while engaged in action and subsequently on the action itself (Schön 1991). Reflection is to think about the design; for example, how it can be improved. Reflexivity is to not only reflect but to turn the experience

back on oneself (Steier 1991). This is done through a “web of moves, discovered consequences, implications, appreciations, and further moves” (Schön 1991, p.131).

Reflective conversation leads to stages of understanding in which the problem becomes better understood through change, and changed through the attempt to understand it; this understanding grows through “appreciation, action and reappraisal” (ibid., p.132).

Researchers engaged in a reflective and reflexive mode of enquiry use this process to change their practices through a “spiral of cycles of critical and self-critical action and reflection” (Kemmis and Wilkinson 1998, p.24). They do this to try to understand the effect of this activity on oneself including how this research has transformed them and how it has varied their self-awareness of their work (Gouldner 1970).

Reflective and reflexive modes of enquiry differ from the more traditional approach of bringing practical work in line with current theories (Schön 1991). Reflective and reflexive modes of enquiry open the way for an alternative paradigm to develop that is more in line with the actual practice (see Fook 1996). Researchers can actively engage in a “reflective conversation with the materials of the situation” weaving this conversation through the different stages of design (Schön 1991, p.131).

By keeping a diary of reflections, sifting through data, re-reading the literature to make new decisions as to the next action, and involvement in continual discussions, one can improve awareness of the processes being used and of oneself (Robertson 2000).

During the design process I used my data collection in the reflective and reflexive critique to inductively draw out design guidelines from the design research, investigative analysis and literature review. I engaged in spirals of reflective and reflexive critique to improve the research and design processes. I did this to identify my own behaviour in changing direction of design practices and to analyse my behaviour; for example, what I have done, how and why I have done it, my reactions to the changes, and evidence of the new ways of designing and knowing created (see Peterson 2004). In so doing I made explicit my own design research processes within my professional practice, and revealed how to engage in change (ibid.).

2.9 Validity and reliability

In quantitative research, validity is determined by whether the researcher measures what they intended to measure and whether the results are truthful (see Bauer and Gaskell 2000). Reliability is defined as the extent to which results are consistent; an accurate representation of the population being studied; and reproducible; however, in qualitative research there is

much debate over whether validity and reliability are appropriate terms for this mode of enquiry (Golafshani 2003).

Healy and Perry (2000) assert that each methodology should be judged in a way appropriate to that methodology. For example, if two designers are supplied some clay and asked to make an object, they will produce two different results; if two action researchers are asked to participate in this activity, then to record, analyse and report on it, the outcome will be unique to each researcher. The researchers may provide very different results depending on their area of focus. This variation in outcome is appropriate to 'design action case' research.

We may ask how reliability can be measured, and what determines validity in action research. Some researchers argue that a positivist definition of validity is not appropriate for qualitative research, but agree that there should be a check for accuracy, honesty and credibility of the findings (Lincoln and Guba 1985; Seale 1999; Creswell and Miller 2000; Stenbacka 2001; Creswell 2003).

Creswell explains that the validation of findings is important and should be conveyed through the steps researchers take to check for accuracy and credibility of their findings. Validity should be used to determine whether the findings are accurate from the standpoint of the researcher, the participant, or the readers of an account (Creswell 2003).

Creswell recommends that any one of the following strategies be used to check validity:

1. "Triangulation" of different data sources (for example, interviews and observations) to build a coherent justification for themes. It also extends to triangulation of methods and of investigators (see Denzin 1978; Patton 1990);
2. "Member-checking" to determine the accuracy of findings by taking the final report or descriptions back to participants and determining whether they felt they were accurate;
3. Using "rich, thick description" to describe the findings;
4. Describing the researcher's "bias" to create an "open and honest narrative";
5. Presenting "negative or discrepant information that runs counter to the themes" as real life is made up of different perspectives;
6. Spending "a prolonged time in the field" to develop an in-depth understanding of the phenomenon being studied;
7. Using a peer review process to review the research;
8. Using an "external auditor" to review the entire project.

(Creswell 2003, p.196)

This iTour research used the above strategies to ensure validity and produce evidence supporting this.

Reliability, on the other hand, can be misleading and inappropriate as a measure of the research quality in qualitative research (Stenbacka 2001). Strauss and Corbin (1990) propose continuing to use the term ‘reliability’ but changing the meaning. Eisner (1991), however, says that reliability means to generate understanding and can be used to test the quality of the research.

Other researchers do not want to use the term reliability. Lincoln and Guba (1985) espouse dependability, not reliability. Clont (1992) and Seale (1999) extend Lincoln and Guba’s view to include support for consistency and trustworthiness (see Golafshani 2003), which is approaching Creswell and Miller’s (2000) definition of validity. Creswell identifies some use for reliability in the traditional sense, as a check for “consistent patterns of theme development among several investigators on a team” (Creswell 2003, p.195) but does not believe that validity requires reliability.

My research involved creativity and a viewpoint that changed with reflective and reflexive practice. As such, reliability was not used as a measure of the quality of the research, as this research and subsequent outcomes may never be consistent and reproducible if repeated. This research did use Creswell’s (2003) approach to validate results, as outlined on page 30.

2.10 Rigour

Rigour in positivist research is the degree to which research methods follow the intended methodology (Guba and Lincoln 2005). With a qualitative approach, the researcher does not have to design the research before starting and can refine the research design as they learn more about the research subject (Dick 2002; Neuman 2003).

Baskerville and Wood-Harper (1996) advocate seven key strategies in conducting action research, which are known to improve the rigour and contribution of the research. My research applied these same strategies to design action research, making refinements to points 1 and 6 in the next table (Table 8) by replacing the word *action* with *design action* in order to extend to design action research. Evidence will be provided throughout the Exegesis that the research conforms to rigour as explained in the next table:

Table 8: Seven Key Strategies to improve rigour of action research

1. <i>Design action</i> research is appropriate for the research question and acceptable to the audience;
2. Participants are provided with informed consent;
3. The research is valid research;
4. Data collection techniques are planned, specified and followed through; for example, information is captured in case study notes or diaries;
5. Careful collaboration is maintained with subjects so they are not dominated and their voice is not drowned;
6. <i>Design action</i> research is cyclical;
7. Generalisations are made even if based on a representative sample of one.

Source: Adapted from Baskerville and Wood-Harper (1996)

2.11 Evidence

Evidence that the research problems and questions have been answered was established in the research outcomes, which included: the design sub-projects and activities that comprise this research project; the descriptions provided for the development and testing of each design; the Guidelines; the literature review; the iTour analysis framework; the analytical review reports; the iTour 11 Principles; and a summary of issues that are different from other genres. Evidence of design excellence was provided through the results of design competitions and the use of design in a production setting.

The evidence provided further understandings of the processes and techniques required to design effective interactive animated tours and to test their effectiveness, in terms of technical communication. New knowledge emerged from the data through observing the output of other designers and through my conversations with these designers; through my own design work; and by drawing on and integrating aspects of research in the parent fields of technical communication, and new media, plus associated fields of web, usability, software, and design. My own journals, documentation and contributions provided records of this emergent knowledge, culminating in the artefacts and Exegesis.

Design action research was evident from the cycles of design; formative and summative evaluation; participant observation, reflective and reflexive practice; and the resultant change and intervention.

In this chapter I introduced the design action case method by first reviewing the design research history from the separation of positivist and qualitative research, through development of design research and action research, then to the formulation of the design

action case. I explained the thematic and content analytical approaches used to identify the themes that led to the guidelines. This was followed by a discussion of reflection and reflexivity, and strategies were described for determining validity, rigour and evidence.

The methodological underpinnings of this research provide a springboard for the literature review, which is examined in the next chapter.

3 Literature Review

This chapter explores the parent fields of technical communication and new media, establishing gaps in existing literature in which this iTour research can flourish. Then the literature is reviewed in terms of presenting strategies for dealing with the design of interactive online documentation; descriptions of multimedia design elements; and identification of where research is required.

In this Exegesis the literature is often cited chronologically, which is intended to create a sense of an evolving journey of research in this emergent specialisation.

3.1 Research within the parent fields

Technical communication researchers provide a range of publications describing online documentation design (see Brockman 1990; Carroll 1990; Horn 1991; Weiss 1991; Price and Korman 1993; Horton 1994; Boggan, Farkas and Welinske 1996; Barker 1998; Tomasi and Mehlenbacher 1998; Redish 1998; Quesenbery 2001; Farkas and Farkas 2002; Barker 2003; Hargis et al. 2004; Hollis-Weber 2004; Albers 2005). These publications focus on overall user documentation design in technical communication.

With Internet access now readily available, hypertext has become an area of focus in its own right. There has been considerable interest by technical communicators, in the document structure and navigation through links and nodes (see Herrstrom and Massey 1989; Horn 1989; Shneiderman 1989; Shneiderman and Kearsley 1989; Rojas-Fernandez 1991; Landow 1992; Selber 1995; Snyder 1996; Lynch and Horton 1999, Farkas and Farkas 2002; Farkas 2004; Shneiderman and Plaisant 2005).

Researchers also recognise that the “convergence of telecommunications and multimedia communications (for example video, audio, text, data) alongside rapidly advancing microprocessor and storage capabilities” (Maybury and Wahlster (eds.) 1998, p.1), plus improvements in input and output devices, would create a huge potential for multimedia interaction.

Technical communication researchers have foreseen the effect of this convergence on technical communication. Farkas (1995) describes the opportunity that technical writers would have for integrating multimedia closely with text. Kemnitz et al. (1995) predict that the emerging technologies of interactive video and hypermedia would “blur the distinction between text-based documents and audiovisual presentations” (p.472).

Cotton and Oliver (1993) and Snyder (1996) recognise that, with hypertext, communicators would have to conceive of text in new ways and that, to successfully integrate multimedia in online documentation, they would have to learn how to orchestrate multimedia to create an integrated and interactive whole.

Heba (1997b) asserts that a large amount of work is required to become familiar with multimedia development. Crucially, for technical communicators wishing to move into working with multimedia, Heba adds that technical writers need a complete reorientation to the composing process, and compares this with learning another culture (*ibid.*).

Based on their 5-year review of journals of the Society of Technical Communication, Rosenbaum and Bugental (1998) identify a need to develop a suitable approach to this multimedia design issue, and to move beyond the current research, much of which was focused on navigation and visual appeal.

In 1990, research on multimedia started to emerge within the technical communication and usability community. Nielsen (1990) released “Hypertext and Hypermedia” followed by a second edition “Multimedia and Hypertext: The Internet and Beyond” (1995b). These texts focus on hypertext but in the second edition Nielsen provides a section on multimedia authoring, in which he suggests that when designing multimedia, a different way of structuring information is required. Further, during the Hyperties experience, Shneiderman found that multimedia information design requires a different structure for each project, and that each project requires a single managing editor to coordinate the project and copy edit the final result (Shneiderman 1989; Nielsen 1995b).

Researchers also explained the purpose of multimedia and how it could be used. Nielsen’s (1995a) Alertbox paper on “Guidelines for Multimedia on the Web” has a brief section on animation to describe its purpose. Horton (1994), and Hackos and Stevens (1997) write about designing information for online documentation products including those running on the World Wide Web. Both publications include a chapter on multimedia, focusing on what each medium could be used for and how to use each effectively.

Horton (1994) does recommend using “VCR-like controls” (p.327) for animations and shows ten types of controls, indicating that even in 1994 acquaintance and ‘comfortability’ with an existing interface design was being acknowledged. Hackos and Stevens (1997) state that users must be able to start, stop and review a video sequence at will. Others including Lynch and Horton (1999) offer similar advice for multimedia objects such as movies.

During the literature review, I reviewed the two major journals by and for technical communicators: “IEEE Transactions on Professional Communication” (1992 to 1997); and

“Society of Technical Communications Journal” (1995 to 1999). I found only eighteen publications on designing with online multimedia. Only two of these articles referred to animation or provided useful design advice that may be applicable to iTours: Horton’s (1995a) article on ‘New Media Literacy’, and Dowhal et al. (1993) ‘Producing a Video on a Technical Subject: A Guide’. There were no articles providing advice on designing online animated guided tours.

A further search through the “Society of Technical Communications” Journals from January 2000 to May 2004 showed that during this time only one relevant journal article was released on designing interactive multimedia. This article describes how to improve user interface design by focusing on usability (see Quesenbery 2001). A reference to guided tours is included but the focus is on finding information. A search of IEEE Transactions on Professional Communication, over the same timeframe, showed no additional articles on the subject matter of iTour design.

The Internet continued to be an area of interest for technical communicators, with research in this field focusing primarily on text-based content or information design and to a lesser extent on visual and graphic design (see Alred 2003). The review of “Essential Works on Technical Communication” (ibid.) shows that technical communicators have produced books on visual and graphic design (see Tufte 1997; Kostelnick and Roberts 1998; White 1998), but not on interactive multimedia.

As with hypertext, Internet research focused on the structure including the physical layout, and navigation design via links. It also covered indexing, usability design and testing online documentation (see Farkas and Farkas 2000 and 2003; Gregory 2004). The Internet researchers did not focus on interactive animation in particular for software documentation or demonstrations.

Further research found sites and publications on general web design that included animation design such as Siegel (1996), Lynch and Horton (1999), and WebMonkey (<http://hotwired.lycos.com/webmonkey/>). This was, however, general information, not focused on technical documentation or animated online tours.

Nielsen’s useit.com (www.useit.com) web site provided a wealth of information on web page design with some sections devoted to animation. The animation sections essentially define the purpose of animation and provide advice, for example, on permanently scrolling animations and the usefulness of Flash. Nielsen’s (2000a) paper on web design focuses specifically on the page, content, site, intranet, accessibility and international design issues. Again there is a section on animation but only to describe its purpose.

There was also literature available on web usability design and testing, which was not restricted to a particular genre of online material (see Nielsen 1994; Rubin 1994; Dumas and Redish 1999; Hughes 1999; Krug 2000; Nielsen 2000a; Barnum 2002).

Only recently, well-known technical communication researchers have started to discuss simulations and interactive animation for documentation. Plaisant and Shneiderman will present a paper on Guidelines for Recorded Demonstrations in September 2005 at the IEEE Symposium on Visual Languages and Human-Centric Computing, in Dallas, Texas. They also refer briefly to animated tours or “demonstrations” (Shneiderman and Plaisant 2005, p.548). Both Carliner (2004) and Horton (2004) held workshops in this field of iTour development. However, the availability of this information was limited to the workshops.

“Essentials of RoboDemo 5: eLearning Edition” focuses on how to use RoboDemo, a third-party tool that can be used to design iTours (Siegel 2003). “Macromedia Captivate for Windows” focuses on how to use the next version of RoboDemo called Macromedia (Green 2004). These books do not, however, provide design guidelines for developing animated tours.

In summary, the search for design guidelines in literature produced by those who research technical communication revealed research in online documentation design, hypertext design, convergence, multimedia and web design, but minimal exploration of designing interactive online guided tours.

Next, I searched the other parent field of new media. Publications were available on multimedia and working with animation and sound online (see Gloor 1997; Chapman and Chapman 2000; Elsom-Cook 2001; England and Finney 2002a and b; Barfield 2004). General design information was available but it was not directed towards the technical writer and not focused on online guided tours. Authors in this area agree that this whole interactive multimedia area was in its “infancy” (Elsom-Cook 2001, p.xi), and was still “constantly changing and evolving” (Barfield 2004, p.xv).

Chapman and Chapman (2000), for example, describe different animation and sound files. They discuss digitising and compressing sound, and synchronising sound with pictures. Brent MacGregor, Head of School of Visual Communication, Edinburgh College of Art, describes the technology as an “enabling” platform to deliver multimedia but says “what is needed now is for a creative infrastructure to develop alongside the software and hardware” (ibid., p.542).

Multimedia Demystified (Apple Computer Inc. 1994) reviews multimedia team roles, processes for developing multimedia, and twelve different project types; but again does not review iTours. Hughes (2000) provides an historical view of the secrets of multimedia design

at a high level. In 'Internet Animation', Chan, Baker and Williamson (2000) debate the usefulness of animation and then focus mainly on product comparisons and technology issues. This is not to say that there was no literature on creating animations but the focus was on character animations, games or product-based development such as by using Flash or QuickTime (see Laybourne 1979; White 1988; Chan, Baker and Williamson 2000; McMillan and Hobson 2001; Chapman 2002; Williams 2002; Kirkpatrick, Peaty and Kirkpatrick 2003; Patmore 2003).

There was useful and supportive discussion in cyberspace research (Dodge and Kitchin 2000 and 2002), which recognised guided tours and referred to them as providing maps of cyberspace. They are described as attempting to break up complex informational spaces into smaller, and more easily interpretable forms. They capture a portion of cyberspace, and show users how to move through this construction themselves and how to achieve specific goals. However, other than defining a new way to consider iTours, there are no specific details for designing iTours.

Research shows that literature exists on designing web pages, online documentation, hypertext, hypermedia, electronic performance support, computer-based training, simulations, online software, mapping cyberspace, new media, and animations. However, at the time of writing, there were few available guidelines from technical writers or interactive multimedia designers on designing iTours. This is a significant gap that is addressed by my research on iTour design.

3.2 Strategies and suggestions for dealing with design

Building upon the previous literature review for iTour guidelines, this section summarises advice found during the literature review from other fields that may be applicable to this research. Critique and comment will not be provided at this point, as the summary is intended simply to indicate the research that informed my early thinking. Critical analysis will be integrated in chapter 10.5 Revisiting the literature review, on page 180.

3.2.1 General advice on understanding the medium

For successful integration of multimedia in online documentation, technical communicators must first understand how to communicate with the individual media elements, before they can orchestrate all the media elements to create an integrated and interactive whole (see Cotton and Oliver 1993; Snyder 1996). This poses new challenges to the communicator, who has been trained to write books and text-based online documentation and who now must decide which information goes into what medium and how to produce it (Sullivan 1991).

Bergeron and Bailin (1997) say that text is only one type of content and that authors must manage and link to other types of content. They must have a full understanding of the delivery technologies so they can acquire and manipulate images, animation and sound. They must contend with the complexities of computer delivery platforms and software tools.

Tomasi and Mehlenbacher (1998) say that multimedia design is different from writing books and traditional online documentation in that it includes storyboarding, prototyping and many usability assessments.

3.2.2 User-centred approach

With the inclusion of new media within online documentation, the primary message is that information must still be user-centred: focusing on users and their needs (Grice 1995). Hayhoe (1998) advocates that technical communicators must know why and with whom they are communicating. He emphasises that the foundation of all effective communication is still the analysis of the audience and the tasks they perform, and having an understanding of the purpose, goals and objectives of the online document. The technical communicator must understand the information requirements of the user (Rehling 1999).

Comparative research across media may be useful, including an assessment of each medium to determine whether or not it works for the audience and the tasks they must perform (ibid.). Mason (1997) states that the documentation must be appropriate to the ability level of the users and the way they process information. To achieve this, user participation is required for researchers to better understand the audience (ibid.).

There is an understanding that although the mastery of the software tools required to create documentation is important, these skills are independent of knowing how to communicate technical information with words, graphics and other media (Hayhoe 1998). In support of this view, Martin (1995) emphasises the message rather than the medium, which he says is always secondary.

3.2.3 Focus on usability

Grice (1995) recommends that technical communicators remember **USABILITY**, which means design that is:

User-centred around users and their needs;

Sufficient—the documentation contains all information users need to do their jobs and no more;

Accurate—the content is correct;

Brief—tells users what they need to know, then stops;

Instructional—tells users what to do;

Logical—describes how to use products in a logical way;

Informative—contains facts and necessary information;

Task-oriented—is organised by user tasks, not by product function. Does not describe how the product operates in a given situation, but describes the actions that users must perform to complete a particular task;

You, the technical writer, are the author of usable information.

3.2.4 Object Oriented Approach

Price (1997) suggests using an approach like object-oriented programming to assist technical communicators face the transition from clearly identified, hierarchical structures and well-worn processes and settled roles (writer, artist, editor) to new levels of complexity. This would facilitate a flow of information coming from sources unknown, presented in structures that cannot be predicted, and is useful in handling the hypertext media structure.

The approach is to assemble a large pile of information by breaking it down into its components then reassembling into sub-components. The focus of this approach is to manage a vast network of electronic pages.

3.2.5 John December's design methodology

December (1996) explains a multimedia design methodology for the web that uses six sets, or six "elements", of information: audience; purpose; objectives; domain (subject); specification (including constraints and elements); and technical structure (including description of hypertext and multimedia). These elements are developed while engaging in six processes: planning; analysis; design (mapping web pages and specifying interfaces); implementation; promotion; and innovation (constant improvement). This hypermedia design methodology shares a resemblance to software engineering practices (ibid.).

3.2.6 Understanding technological constraints

The design and creative limits of interactive online documentation are subject to a set of constraints provided by the delivery platform including the operating system, CD-ROM speed and throughput, video display capacity, network bandwidth and web browser version (Bergeron and Bailin 1997). For example, in a high bandwidth departmental intranet, where the hardware and software are known, large illustrations with audio can be provided. In low

bandwidth situations, attempting to match sound to a video, for example, can prove problematic (ibid.).

3.2.7 Teamwork and project management

Martin (1995) highlights that the requirement for teamwork and project management is crucial, as each of the new media areas requires qualified experts. This is important because technical writers are often used to working independently in the production of their online documentation. When they work in teams of writers, graphic designers and editors, the technical writers have significant control of the documentation design (ibid.). At the time, this would have been a new work practice for many technical writers.

More traditional technical writing projects require a different team structure than interactive online documentation projects, which use a cross between a software development team and a video production team structure. Even if the project is small, the interactivity changes the personnel required to produce the end result. Such team members can include writers, editors, graphic designers, programmers, multimedia specialists, video specialists, instructional designers, project managers, and user interface specialists (Tomasi and Mehlenbacher 1998).

Project managers require recommendations to integrate document planning with management thinking to ensure efficient production of the end result. For example, during the design phase, Rehling (1999) advises that it is inappropriate to have the web people and paper people each analysing and writing similar material separately; teamwork is required.

Bergeron and Bailin (1997) say that it is more difficult in multi-authored projects to impose a common style that seamlessly integrates content from the authors. He suggests imposing common keywords and content phrases.

3.3 Individual design elements

The previous section reviewed six strategies presented to technical communicators for managing and understanding multimedia design. The discussion will now summarise advice on individual media.

3.3.1 Animation

Horton (1995) says that animation can be used to do the following well: explain how objects move and change—especially good for describing complex mechanical devices; analyse processes; explain abstract concepts; improve comprehension; increase interest; focus the

viewer's attention on important aspects of graphics or display; handle sensitive subjects; and show dangerous subjects.

3.3.2 Audio

Audio can be used to: complement the visual; support the reading of the text; give instructions; create a mood; motivate; and draw and hold attention (Aaintzen 1992; Mason 1997). Good readers prefer video, but bad readers prefer audio; however, it is important to avoid over reliance on audio as the document may be viewed in a noisy area (Mason 1997).

3.3.3 Video

Connelly (1995a and b) observes that to understand more about the video medium, technical writers must understand something about the process of making a video. He recommends exploring the roles played by the key members of the production team including the producer, writer, director, production crew and videotape editor. He also recommends examining the three stages to video production: pre-production; production; and post-production.

Further, he explores the writer's role within the development of a video, which includes: researching the subject; determining the communication objectives; defining the audience; devising a strategy for matching the client's purposes with the audience's motivation; writing the treatment that sets the writer's approach; and developing the treatment into a complete production script.

Connelly (1995b) says that four guidelines or constraints apply when developing a script: purpose—understand the client purpose, audience motivation, and audience response; time—develop the script within the time required; budget—write the script to provide a final video that is within the client's budget; resources—develop the script around the resources that are available to the client.

Dowhal et al. (1993) further explore the three stages of production, which they define as:

1. Pre-production:
 - a. Planning (budget and schedules; for example, video shooting);
 - b. Scriptwriting (technical, storyboard and audio);
 - c. Location selection; and
 - d. Casting (for technical descriptions use in-house staff who understand the technology; hired actors may not show the same enthusiasm).
2. Production: Assembling the technical experts on location and recording; and

3. Post-production: Editing the tapes into one master tape, then copying the tape for distribution. The storyboard should be used for guidance.

Dowhal et al. (1993, p.68) also claim that pre- and post-production take the longest time and provide a breakdown of the steps involved over a seven month period to create a 40 minute video, as follows:

1. Structure or design the video – 6 weeks;	5. Record the narrator, the music; and videotape the presenters – 2 weeks;
2. Write the script – 3 weeks;	6. Arrange the packaging – 1 week;
3. Review the script – 4 weeks;	7. Edit the video – 1 week;
4. Create the animation and artwork – 3 weeks;	8. Duplicate the video – 2 weeks.

Dowhal’s team reviewed other videos before making their own so they could determine what worked and what did not. Frequent problems were that videos were dull, lacked editing, were poorly cast, and sometimes addressed topics that were unsuitable for the video medium.

Useful recommendations by Dowhal et al. (1993) are:

- If the team consists predominantly of technical writers, the following work should be contracted out:
 1. Camera work, lighting and editing;
 2. Animation, if no in-house skills exist; and
 3. Professional musicians.
- Use work colleagues or staff as voice models to talk about the product, as they will normally show more enthusiasm than the voice models hired for this task (ibid.).

3.3.4 Navigation, structure and layout

In the technical communication publications there was much research on hypertext and hypermedia with web navigation. Kemnitz et al. (1995) describe the move in hypertext documents away from a traditional linear approach to documentation, and instead present information in chunks or nodes that can consist of text, graphics or video segments.

The layout must support the user’s tasks (Rosenbaum and Bugental 1998). Alternative mechanisms for searching and navigating documents should also be provided; for example, those based on task type, learning style and specific information goals (Tomasi and Mehlenbacher 1998). “Contextual” feedback should also be provided so users always know where they are within an example or task (ibid.). Mason (1997) suggests using a map to prevent disorientation.

Rosenbaum and Bugental (1998) discuss structuring tasks in a logical “progression”, so users can keep track of where they are. Heba (1997a) states that a complicating factor is that hypertext decentres a document’s structure by linking to other documents. Each page may be read in or out of context; therefore, there must be enough navigational information on the page so the user knows where they are and where they are going.

December (1996) focuses on principles of navigation, structure and layout for Internet pages and web-based interactive online material. He advises to ‘chunk’ information into page-sized chunks, create a coherent and consistent ‘look and feel’ using principles of page layout and design, and provide plenty of navigation cues. Mason (1997) proposes developing a balance between too much and not enough navigational freedom.

In terms of format and page layout, Rosenbaum and Bugental (1998) say that users want the object of their immediate interest to be large and centrally located and they want all their choices to be visible at all times. Users find it difficult to separate visual appeal from good format and page layout (ibid.).

Hypertext and web navigation is still of interest for iTour design, as it is envisaged that the iTours may be embedded within web pages.

3.3.5 Interface

In order to make the underlying technology transparent to the user, Harmison (1997) recommends maintaining a single window to display everything including multimedia.

Tomasi and Mehlenbacher (1998) suggest embedding hypermedia within the software application or product, as it may not work as well when it is external. They also advise using real-world work examples from real situations so users may actually “use, revise and explore” multimedia in completing their tasks.

Users expect display screens to be understandable; transparent as to the mechanics; intelligent in dynamic interaction; animated; and capable of being read at an acceptable speed (Queipo 1986, p.11).

In a study conducted by Hailey and Hailey (1998), they found that more students preferred automatic sound on an interface, to sound requiring activation by clicking a button. Students also preferred the interface to represent an operator’s panel (they were learning how to use a lathe) rather than an interface based on a page metaphor.

3.3.6 Understandability

Users expect the online documentation to be understandable, which includes using familiar language with minimal jargon, and not too much information on the screen as this reduces reading speed. They also expect information to leverage on their existing knowledge (Queipo 1986).

Visual design, in particular animations, is intimately bound to experience; therefore, the creator must be sensitive to the culture from which the audience comes (Rubens 1987; Kostelnick 1995).

3.3.7 Colour

Navigation problems can result due to colour cues that may have been too subtle (Rosenbaum and Bugental 1998). The use of colour can increase information recognition. Mason (1997) advises that colour keeps up a reader's interest, increases the accuracy of information retrieval, and is important for reducing eye fatigue.

3.3.8 Tone

A friendly tone should be used, not condescending (Queipo 1986).

3.3.9 Summary

Technical communicators should not be constrained by their level of comfort but be able to embrace the new media and incorporate it into communication where and when required. I do not advocate that all technical communicators become masters in each of the areas of new media, as years of study and practice are involved. However, it is essential for them to understand how to approach communicating using the other media, and to know and understand the constraints and limitations of each.

Technical communicators need to learn new skills to convey their message if using the evolving technology. Martin (1995) states that now is the importunity to "learn to evolve further, in step with the new technology" (p.97), and recommends that skills technical communicators can develop or activities they can undertake are as follows:

- Writers can learn how to storyboard;
- Editors can learn to edit audio and video scripts;
- Graphic designers can learn how to develop appropriate screen layout and colour schemes;
- Usability testers can evaluate how well the overall design works;

- Project managers can coordinate the new activities required;
- Everyone can learn how to work with or take on new technical roles required to make projects work, such as programming, audio, video and animation creation; and
- Researchers can re-evaluate and refine the standards for quality in technical communication.

(Martin 1995)

The purpose of this literature review was to contextualise the research project and provide a summary of published advice on multimedia and animation, relevant for technical communicators. From this review we observe the paucity of reference materials specifically related to the design of online animated tours. As explained, the summary has not been critiqued at this point because it was a springboard for the ongoing journey. Critical reflection on the literature review is incorporated in Chapter 10.5 Revisiting the literature review, on page 180.

We will now explore the practical aspects of designing and testing the sub-projects while viewing the resulting artefacts in the design repository.

4 Design and Test Sub-projects

This section is the start of the three iTour design and test sub-projects. The documentation is designed to be read in parallel with observing the components that were designed and developed. Each time there is an Instruction box, such as the one below, this is an indication to refer to a design artefact in the web site. The instruction box will contain instructions on how to find the artefact.

Instructions	For example, you will be asked to locate the artefact in the web site by either following the instructions or simply selecting a link such as Sub-project 1 . For the link to display, the Exegesis should be run from the web site.
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With a goal of more deeply understanding designing and testing animation within documentation, I immersed myself in the first sub-project and the start of the six activities, as shown in the diagram below, that comprise this research.

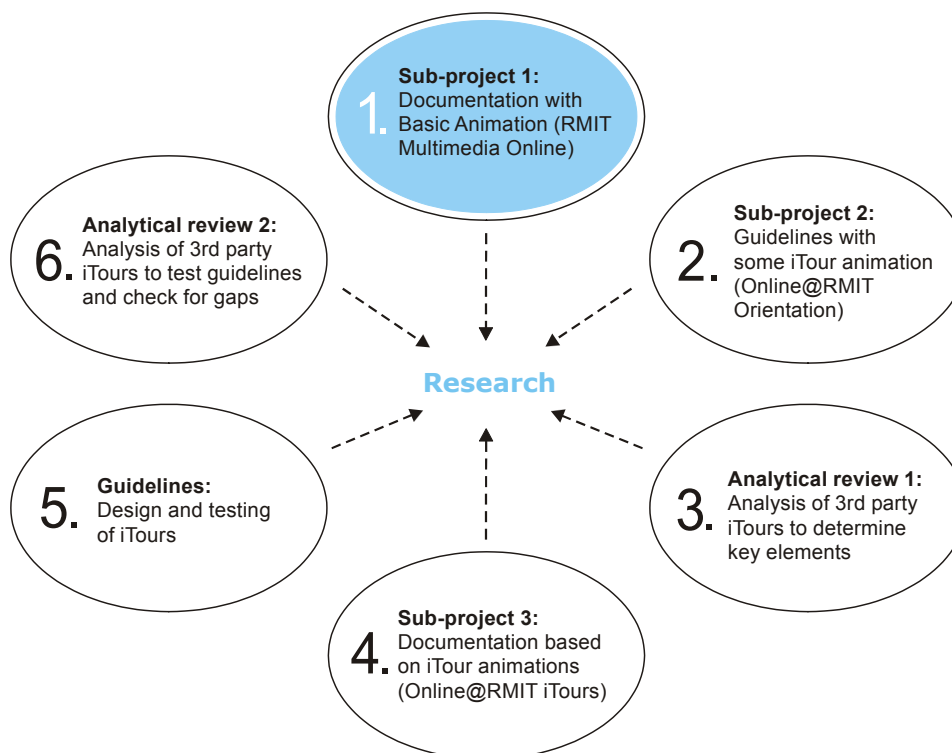


Figure 7: iTour Project research activities emphasising Sub-project 1

In Sub-project 1, I designed and developed online documentation for students studying through RMIT Multimedia Online, an early RMIT initiative into online learning. Sub-project 1 combined animation and documentation design, and was the first step towards the iTour concept. This first sub-project became an exploratory study into documentation incorporating animation. However, as this sub-project focuses on basic animation, not specifically on iTours, a review of the project is not included in the Exegesis. The review can be located on the iTour project web site.

Instructions	To find the Sub-project 1 description, go to the iTour Project web site then select Sub-project 1 followed by Project description .
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The documentation component of RMIT Multimedia Online required six weeks to design and develop, of which the animations required two weeks of elapsed time. Four months were required to test RMIT Multimedia Online, which focused on testing the content of five courses plus the student documentation. In this test one hundred RMIT staff members acted as students so they could experience online learning.

The animated documentation was awarded the first prize of the 1998 Australian Society for Technical Communication (Victoria) Technical Writing Competition. Feedback from the judges included: “The graphics help comprehension and interest, i.e. large directional arrows, screens animated characters, colourful examples” and “Writing and editing quality are excellent. Coupled with the graphics quality this publication provides a highly integrated effect.” Feedback from the judges demonstrated that Sub-project 1 contributed to “design excellence”, which was proposed as a key defining factor within practice-based PhD research that focuses on design (Norman, Heath and Pedgeley 2000).

5 Sub-project 2: Online @ RMIT Orientation with iTours

5.1 Introduction

In 1998 the RMIT Distributed Learning System (DLS) team, in which I was working at the time, launched Online @ RMIT: the RMIT online learning platform. The second sub-project for this research was the design and testing of an online orientation to show RMIT staff and students what they could expect when teaching and learning online. Such a presentation was also required to show at sessions for other educational institutions and industry clients.

The diagram below depicts this sub-project as the second of six major activities, which comprised the iTour Project:

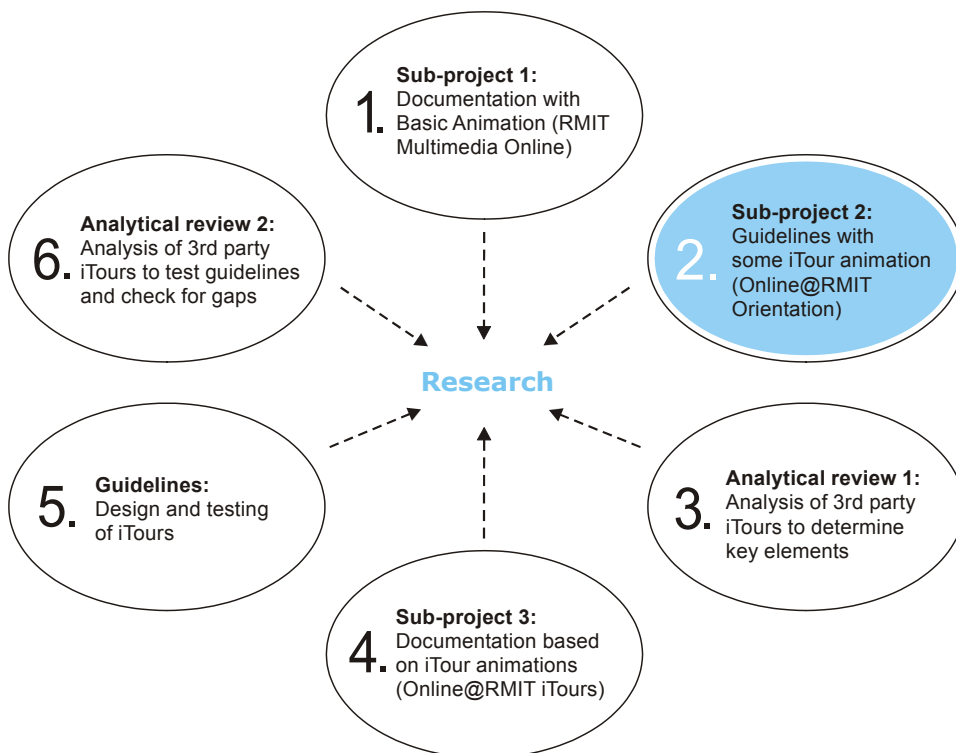


Figure 8: iTour Project research activities emphasising Sub-project 2

This Orientation was created in 1999 when online learning was a relatively new activity at RMIT. The Orientation offered three fictitious student-based case studies showing on-campus, near campus and distance experiences. One case study was based on a staff

member's teaching experience—again fictitious. The Orientation used animation to illustrate basic teaching and learning strategies used in Online @ RMIT. These strategies included concepts, practice, opinions, ideas, teamwork, skills and research.

The Orientation was designed to provide an overview of situations and strategies. The exception was that I was permitted to illustrate how to log in, how to use the Learning Hub interface (the first page the user sees after logging in), and how to use the Orientation via the iTour animation concept.

With initial project discussions commencing in June 1999, design and pre-production activities commenced in August, and development from September. The CD version with sound, which is the focus of this chapter, was completed early in January 2000. In the following May, an HTML version with no sound, was created to run on the Internet for general access.

The final version was distributed on CD to all 3,000 RMIT staff members, to 15,000 RMIT first year students in preparation for the commencement of Semester 1 in March 2000, and with 2,000 prepared for casual staff and industry. For the new students, the Orientation was included with other information useful in a tertiary environment such as how to study and take notes.

This second sub-project involved a production team assembled specifically to create the Orientation. It consisted of nine participants working on different components. The sub-project also used a reference group of an additional eight staff members to guide the activity and provide feedback.

My roles in the design and testing of the Online @ RMIT Orientation were:

- Action researcher;
- Project manager;
- Tester and co-designer for the overall orientation; and
- Technical writer, content expert and co-designer for the iTour component.

5.2 Design and testing

An overview of the design process is explored in this chapter and is shown in the diagram below:

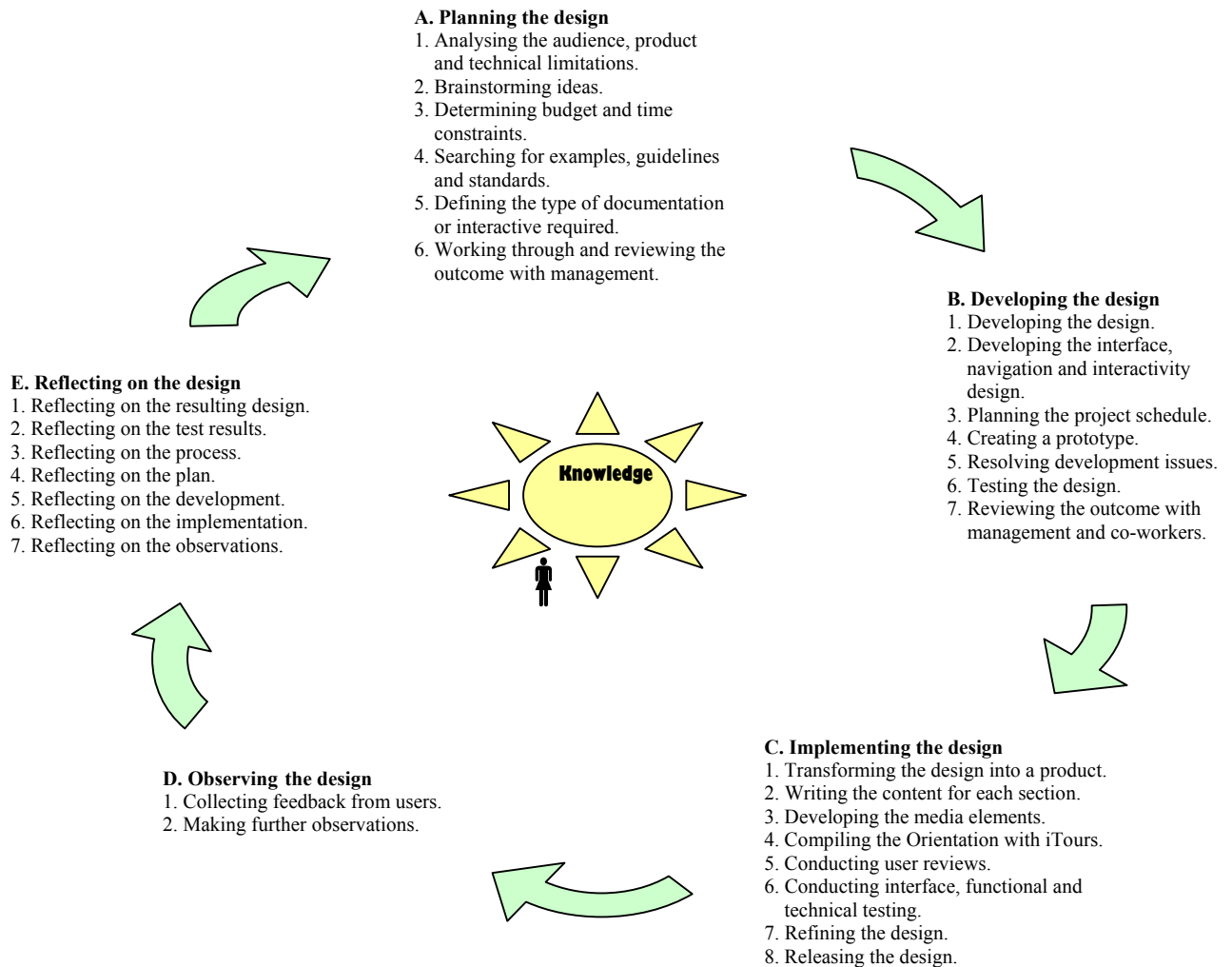


Figure 9: Online @ RMIT Orientation PDIOR design cycle

5.3 A. Planning the design

1. Planning -> 2. Developing -> 3. Implementing -> 4. Observing -> 5. Reflecting

The first phase focused on starting up and defining the project, determining the project boundaries and planning the design. During this phase, I worked closely with the DLS Manager:

1. We identified the audience—RMIT students, industry clients, staff and other educational institutions—and what they needed to know from the Orientation;
2. We identified the product to document; in this case it was both a product (Online @ RMIT) and a concept (teaching and learning online);
3. We identified the type of documentation required;
4. The manager determined the amount of money available for the project (\$A20,000). To keep the cost down, initially I decided to minimise the use of sound, but then later reversed this when we found that sound was affordable within our budget;
5. We established an end date after which I developed an initial timeline for the project;
6. We conducted brainstorming sessions to identify the type of new media presentation required and the information to include;
7. We searched for examples of stimulating animated online documentation that could be used to inspire the Orientation design. The next section contains more information on this search;
8. Over this first phase, I considered possible products with which to develop the animation including Macromedia Director or Flash. After consulting with the graphic designers, I decided to prototype using both Flash and Director and then make the final decision;
9. I searched for standards for designing systems with new media in order to guide the production team, who were experienced with managing software development projects but were new to managing new media projects—see the section About the standards, on page 55.

In the next part of this chapter, discussion continues on the search for examples and standards.

5.3.1 About the examples

In order to facilitate the design process I searched for other iTour examples and also referred to a design from Sub-project 1, which is located in the web site:

Instructions	To find Sub-project 1, go to the iTour Project web site then select Sub-project 1 then select User Documentation .
---------------------	---

One new inspirational iTour from eRoom Technology was found at www.eroom.com (Accessed: August 8, 2005). Features of interest from the eRoom tour at the time were:

- In the interface, the contents displayed in a column on the left side of the page—similar to the interface design I used in the previous sub-project;
- With the new media design, the person viewing was led through a guided tour of the interface in which animations were used to demonstrate the eRoom software; and
- With the interactivity and navigation: the iTour could run on its own like a video or movie, or the viewer could take control and click on any menu selection, at which point the animation would display the object that was selected.

5.3.2 About the standards

Next, I commenced a search for standards on designing systems with new media, as it was the first time I had managed a new media project:

- I explored Standards Australia and IEEE design documents but I only found documents available for software design, not multimedia design;
- I met with a multimedia designer from the Australian Broadcasting Corporation (ABC) but he could not refer me to any guidelines or standards;
- Next I checked the Internet and found a newly released two-part book about project management specifically written for multimedia design (England and Finney 1999a and b). It was useful in providing information on general project activities; and
- I also searched for information on scriptwriting but the examples I found focused on traditional scriptwriting for video.

5.4 B. Developing the design

1. Planning -> **2. Developing** -> 3. Implementing -> 4. Observing -> 5. Reflecting

After this preliminary planning phase, the sub-project moved into the development phase in which knowledge from the preliminary analysis was transformed into a detailed information design and prototypes. Specifically:

1. I planned the project schedule and worked out the cost for each activity;
2. Influenced by England and Finney (1999a), I wrote the design document and used this document to communicate with the production team, and with the reference group and committees that were monitoring the work on the Online @ RMIT Orientation;

3. I commissioned a Graphic Designer to develop four prototypes for the Orientation using Macromedia Flash;
4. I reviewed the prototypes with the DLS Manager and Team. We decided that the final version would be an amalgamation of two of the four prototypes;
5. I established the production team, which is described in the next section together with the reference group;
6. I finalised the development platform in Director, based on a request from the multimedia developer that he develop the Orientation in Macromedia Director. The rationale was that Macromedia Flash was newly released; given the timeline, he was confident he could meet it with Director, but not with Flash;
7. The multimedia developer prepared a prototype using Flash based on the result of the previous work on the prototypes; and
8. The project was reviewed with the DLS Manager and with Academic IT Committee (AIRC) on the basis of the design documentation and success with the prototypes, and was permitted to proceed into full development.

5.4.1 About the design document

The design document described all aspects of the Orientation design. In it I included a project description, content design, interaction design, and information briefs for the graphic designer and multimedia developer. I prepared multiple versions of this document to reflect the emerging design as it grew and developed over time.

The design document was reviewed and accepted by the reference group and by the DLS Manager, and was used in committee meetings at RMIT to explain the Orientation concept and to ensure funding. It was used as a working document until all entries in the design document had been developed in the Orientation, at which point it was no longer required except as a reference document.

For an example of the design document, see the iTour Project web page following the instructions:

Instructions	To find the Sub-project 2 design document, go to the iTour Project web site then select Sub-project 2 followed by Design Document .
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A sample from the design document including the proposed graphic design is shown below. The example shows that the menu selections would display on the left side of the screen, and

for the case studies, on top of the screen as well. The animation would appear where my photograph is:



Figure 10: Online @ RMIT Orientation proposed graphic design

5.4.2 About the Flash prototypes

The first prototypes commissioned were a set of four Flash prototypes, which are found in the web site.

Instructions	To find the prototypes, go to the iTour Project web site then select Sub-project 2 followed by Prototypes , then choose a prototype.
---------------------	---

Two of the four prototypes were amalgamated to form the final Orientation design. Images of the two successful prototypes are shown as follows with the successful design elements highlighted:

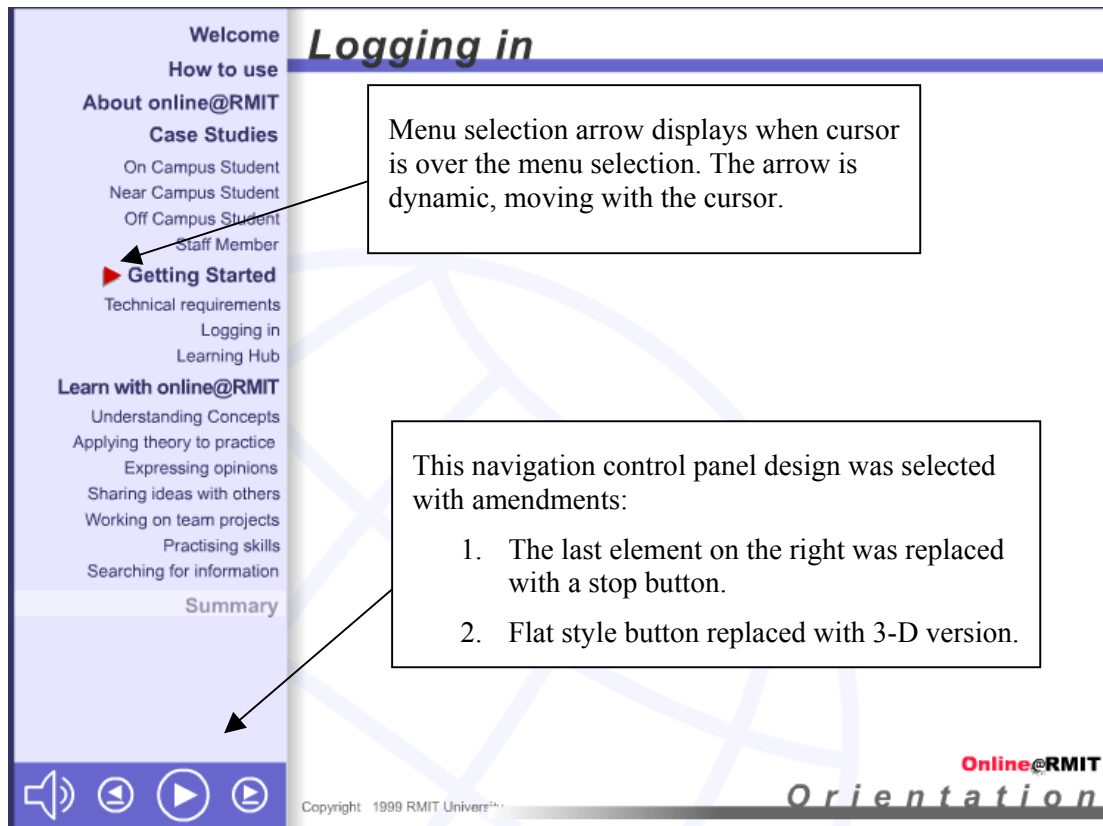


Figure 11: Online @ RMIT Orientation Prototype 1

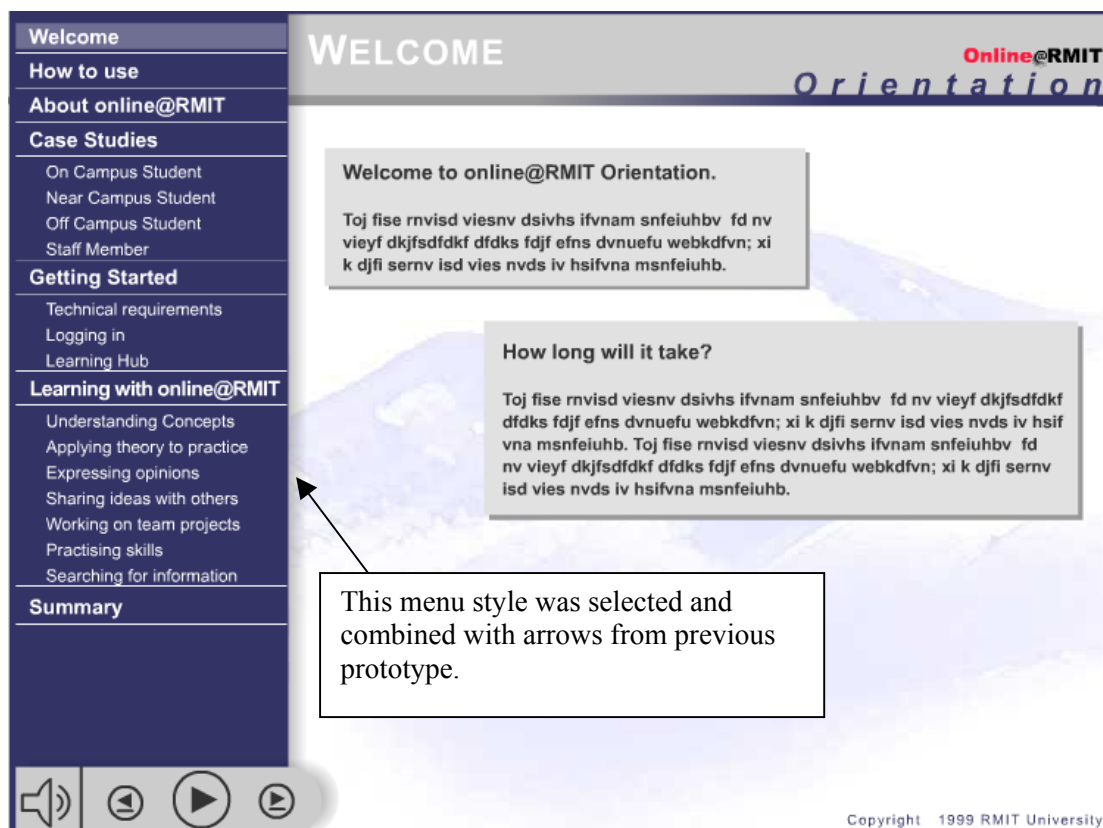


Figure 12: Online @ RMIT Orientation Prototype 2

5.4.3 About the final design

The final design that resulted from amalgamating two of the Flash prototypes is shown in the next figure:

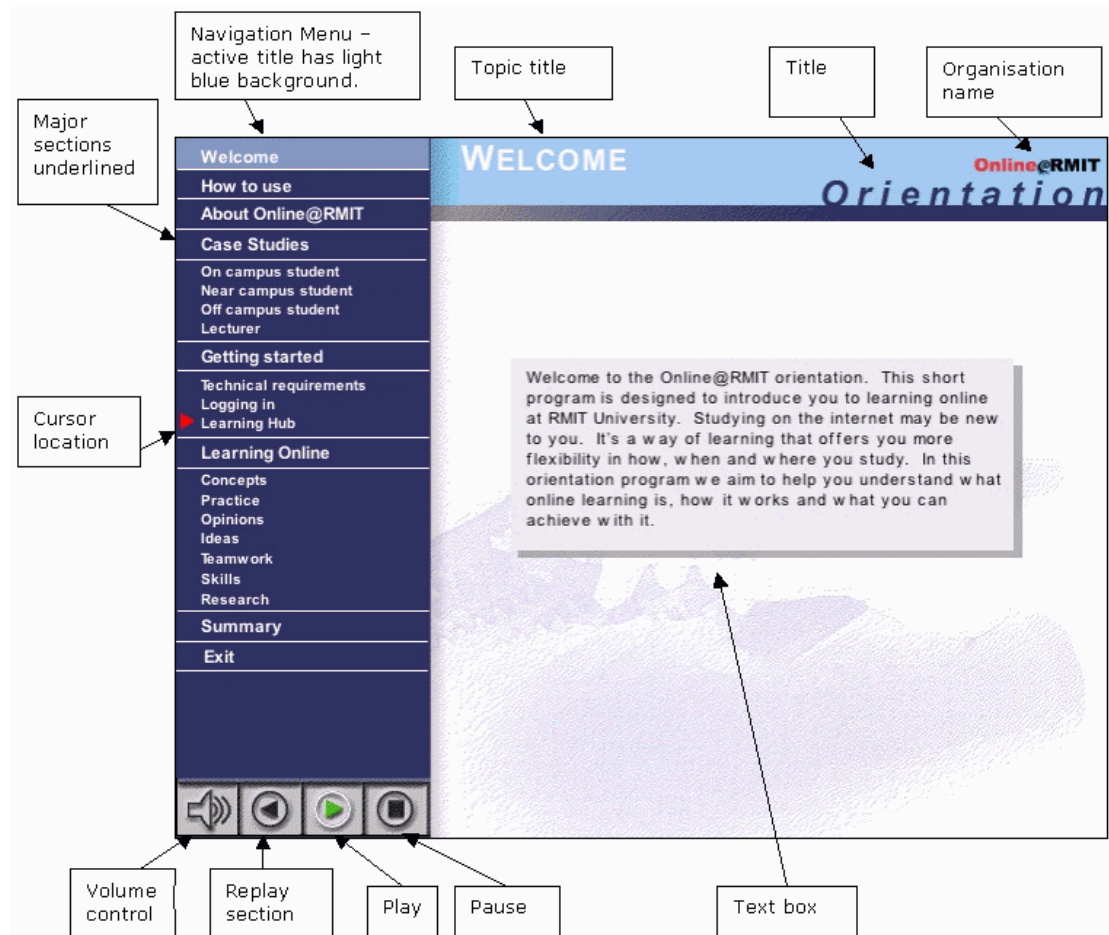


Figure 13: Online @ RMIT Orientation interface design

This section describes the screen components. It is taken from an excerpt of my notes:

Menu

- Menu displays on the left side of page: white on blue;
- Current or active title has light blue background;
- Red arrow head shows which title the cursor is rolling over or is pointing at;
- Major section heading is underlined, for example, Getting Started and Learning Online; and
- Sound: although initially had recorded the name of each heading or menu selection, did not use as it sounds very busy when the cursor is moving around the page.

Heading

- Includes heading, for example, Welcome; plus branding, such as, Online @ RMIT Orientation;
- Size of font, and placement of Orientation; for example, on or above blue lines required several iterations; and
- Sound: although initially had recorded the name of each heading or menu selection, did not use.

Content area





- Displays each section of the Orientation;
- The length of time each section was displayed dictated by the voice-over. When the voice-over was completed, then the Orientation displayed the next section;
- There are four different content ‘types’:
 1. General information such as the introduction;
 2. Student and staff case studies;
 3. iTours—these are the only types described later in this chapter;
 4. Methods of teaching and learning.
- The original decision was to display text on the right side of the photos and images, but the designer decided it would look better underneath. Too much text caused the page to look ‘lopsided’ and some of the longer text went off the screen.

Control area

- Control area was modelled after a video player interface;
- Surface of the control buttons is designed to appear three dimensional so they look like buttons;
- Control panel displays underneath menu; and
- No sound is associated with the buttons.



Volume Control controls the sound. See the table below for the different button modes or settings:

Table 9: Online @ RMIT Orientation navigation button modes

Button	Description
	Default setting and loudest setting. Select this button to get the next level of sound, which is no sound.
	No sound setting, but sound files are still downloaded. Select this button to get the next level of sound, which is the low volume sound setting.
	Low volume sound setting. Select this button to get the next level of sound, which is the mid volume sound setting.
	Mid volume sound setting. Select this button to get the next level of sound, which is the high volume sound setting.



Replay button replays a section. See the table below for the different button modes or settings:

Table 10: Online @ RMIT Orientation replay button modes

Button	Description
	Replays a section from the start.
	When selecting or clicking on the button, it turns blue.



Play button starts the interactive if stopped. See the table below for the different button modes or settings:

Table 11: Online @ RMIT Orientation play button modes

Button	Description
	Indicates the interactive is playing.
	Indicates the interactive is stopped. Select it to start up.

Stop button stops the interactive. See the table below for the different button modes or settings:

Table 12: Online @ RMIT Orientation stop button modes

Button	Description
	Indicates the interactive is playing. Select this button in this state to stop the interaction.
	Indicates the interactive has been stopped.

5.4.4 Interactivity and navigation

The interactivity was designed to be very simple:

- The Orientation can simply play through like a video or the user can select any item in the menu;

- Selecting an item, highlights the item to light blue and displays the appropriate interactive on the right side of the page;
- Selecting Exit or pressing Escape, terminates the Orientation; and
- The control button's interactivity documented above was given careful consideration in terms of their interactivity and navigation design.

5.4.5 Sound

There is only one type of sound: voice-overs. For all the text displayed, except the menus and headings, there is a voice-over, which is meant to be the same as the text.

5.4.6 Accessibility

A member of the RMIT Disability Liaison Unit was invited to join the Orientation reference group, to assist in addressing accessibility issues. One such issue was ensuring that redundancy, or the provision of information in several ways, was built into the design. Two examples of redundancy used in the Orientation were:

1. It used both voice-over and text, each almost the same as the other;
2. It used pictures and animation to support the text and voice-over.

5.4.7 About the production team and the reference group

The members of the production team and reference groups included:

Table 13: Online @ RMIT Orientation team members

Production team members: <ul style="list-style-type: none"> ▪ Orientation Project Manager (myself); ▪ Educational – multimedia consultant; ▪ Multimedia programmer; ▪ Graphic designer; ▪ Technical writer – scriptwriter; ▪ Sound producer; ▪ Photographer; ▪ Editor; and ▪ Tester. 	Reference group members: <ul style="list-style-type: none"> ▪ A representative from the Deputy Vice Chancellor Teaching and Learning Office; ▪ Head of the Disability Liaison Unit; ▪ Acting Director of Teaching Quality – Faculty of Applied Science; ▪ Lecturer – Faculty of Applied Science; ▪ Lecturer – Faculty of Art, Design and Communication; ▪ Online learning coordinator – Library; ▪ Lecturer – Faculty of English, Language and Community Services (FELCS); and ▪ Lecturer and Learning Technology Mentor – FELCS.
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5.5 C. Implementing the design

1. Planning -> 2. Developing -> **3. Implementing** -> 4. Observing -> 5. Reflecting

The design implementation phase included very detailed work to develop each of the components to specification and then ‘stitch’ them together to form the Orientation. During the phase:

1. I wrote the content for the iTours and the technical writer wrote the content for each of the other sections;
2. Appropriate team members developed the media elements including all the sound, photography and animation files;
3. The multimedia programmer compiled the interactive, for example ‘stitched’ together the elements;
4. I did extensive testing to ensure the interface was correct and it functioned well. The multimedia programmer tested on a Macintosh platform and I tested on a Windows platform. An editor reviewed the script before it was transformed into the Orientation and afterwards. After I completed my test, I commissioned a PhD student who was also a multimedia designer first to provide usability feedback and then to test the functionality. Feedback from the testing was sent back to the multimedia programmer daily;
5. I conducted informal and simple user reviews of the Orientation with members of the team, reference group and a student. People were asked simply for their opinions on the interface. I did not provide direction; for example, I did not ask them to complete certain activities; and
6. The multimedia programmer published the interactive to CD and the DLS Team distributed to all academic staff and all incoming first year students.

It was important to obtain iterative feedback as part of my reflective process.

Example of feedback from an individual in the reference group

...First, over the course of yesterday and today I have had widely varying results. Last night, using IE 5, high-end machine and 56K modem it was so sloooooow to load I gave up. I got some images, but no sound. Earlier in the day with Netscape 4.5, Pentium II 300 on RMIT network I got images but no sound. This morning using Netscape 4.5, RMIT network, Pentium I only, it worked fairly well. It stopped at the end of the “How to Use” section, right after telling me I could sit back and enjoy the ride!...

The feedback, in conjunction with testing each version of the Orientation, was important to

find technical problems with the Orientation. This feedback was requested in conjunction with specific technical testing on the interface, functionality and different technology. I collected all feedback and would then write up lists of ‘fixes’ or corrections, and send them to the developer. When he sent back another draft of the product, it would undergo the same process again.

5.5.1 Early iTours

There are three animations within the Orientation which are iTours including:

1. How to Use the animation;
2. How to Log In; and
3. Quick tour of the Learning Hub.

The iTours are found by running the Orientation.

Instructions	To run the Orientation, go to the iTour Project web site then select Sub-project 2 followed by Run the Orientation with sound .
---------------------	--

These iTours are shown in the screen below:

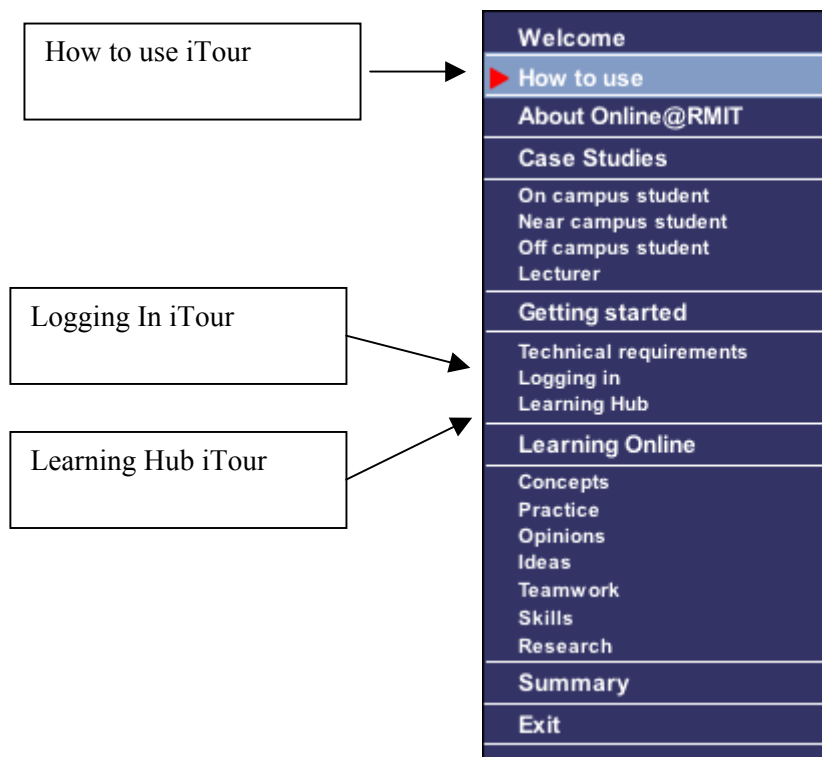


Figure 14: Online @ RMIT Orientation menu with iTours

My role in development of these animations was to provide a high-level design of the iTours; prepare the storyboard and script for the iTours; work through design issues with the multimedia programmer; monitor the iTour development; and then test the iTours. Although there was a technical writer assigned to the project, I worked on the design and writing for the iTours as that person was unsure of what I wanted to achieve, and had not done this type of technical writing before.

The information on the animations is presented in reverse order to how they are listed in the Orientation, but reflecting the order in which they were developed. This is important to show because with each iTour, different features were added.

Learning Hub iTour

This Learning Hub iTour provided a tour of the Learning Hub that is the main screen in Online @ RMIT, through which students can access their course (subject) material. The animation used:

- A screen capture of the Learning Hub;
- Text bubbles to describe the screen;
- Highlight boxes for particular sections of the page to focus the user's attention; and
- Voice-overs with the same text that displays on the screen.

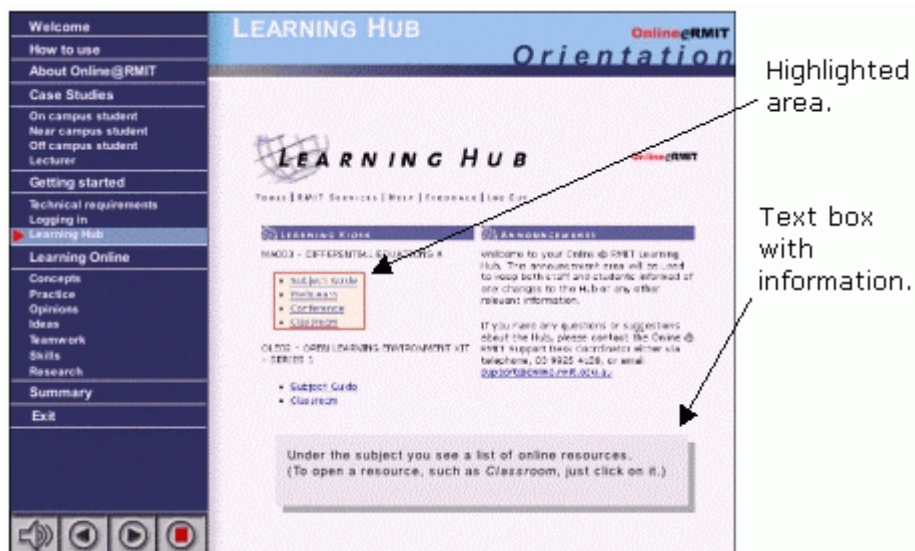


Figure 15: Online @ RMIT Orientation Learning Hub iTour screen example

'Logging In' iTour

This second animation demonstrated how to log in to Online @ RMIT. It used the same features as the Learning Hub animation, including screen captures of the log in process and text bubbles describing the screen. However, there are variations:

1. The highlighting tool is a red circle rather than a red square filled in with yellow shading, as shown in Figure 16;
2. The cursor was used to focus attention by moving to and pointing at a specific area, rather than simply highlighting it; and
3. Transitioning was used to bring attention to the fact that a new section had started.

There was discussion with the developer as to whether we should include the browser window with the URL in the display. The developer advised against it due to lack of screen space to show a browser, and suggested the cursor moving to the link instead.

In the logging in section the voice-over was different from the text, as I further refined the text after the voice-over was taped. The variation is small and none of the reviewers commented that they considered this a problem.

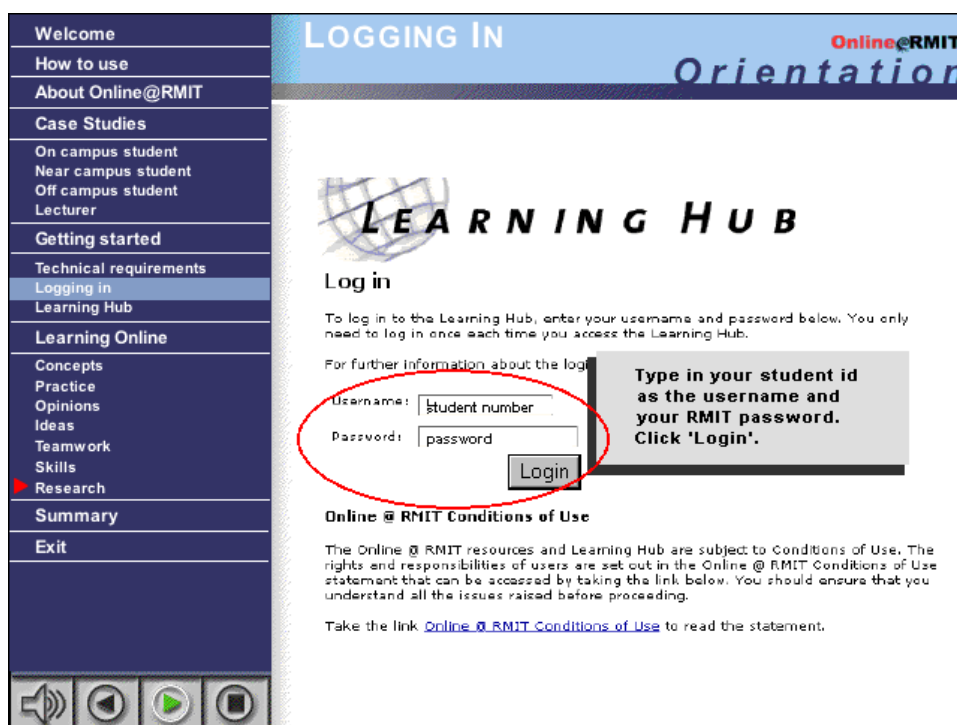


Figure 16: Online @ RMIT Orientation Login iTour screen example

'How to use' iTour

This animation demonstrated how to use Online @ RMIT. It used the same features as the Learning Hub animation including screen captures of the login process and text bubbles describing the screen. However, there were variations:

1. The 'How to use' iTour used the Orientation itself to demonstrate how to use it;
2. The cursor is used to focus attention by moving it to the area being demonstrated; and
3. Transitioning is used to open up a new window.

The developer had the most control over this design and again extended the design. This time the animation used itself to demonstrate how to use the menu, menu tabs in the case study section, and the control panel on the lower left side of the screen.

When the control panel was being demonstrated, the viewer could not stop the animation. A larger example of the control panel is shown in the right side of the page but at an angle, as follows:



Figure 17: Online @ RMIT Orientation How to Use iTour screen example

Each animation used different features from the previous animation. At the time this inconsistency was noted, but there was no time to change it. The variety of approaches seemed usable, so the differences were left. I had not specifically told the developer that they must be consistent, so he trialled different features to improve each iTour.

It was interesting to see the design being extended as this was unlike my experience with software design, where the product was specified and then developed exactly to the specification unless a flaw in the design forced a new outcome. At this point I was not aware of consistency and its importance with other designers and was simply enjoying the evolving design.

5.5.2 Testing

Extensive functional testing was conducted including editing every page and checking for grammar, spelling, and understandability; checking the content for accuracy against the original scripts; checking for consistency and conciseness—if text was too long and covered too much of the page then it had to be shortened; checking interactivity; testing the animation on Macintosh and Windows platforms on which it was expected to operate; and every interactive feature, for example navigation, was tested in every mode.

A list of some of the issues encountered during a review of an early version of the Orientation is as follows:

Table 14: Online @ RMIT Orientation issues in early version of product

<p>Graphic Design Issues</p> <ol style="list-style-type: none"> 1. Multiple use of fonts and case sizes. For example a different font was used for each of four different headings; 2. Window not large enough; text being cut off; 3. Animation positioned too low on the screen; want to move it up 1 to 2 pixels; 4. Double spaces after sentences. Old fashioned. Wanted them removed. In the end they were left in as they improved legibility; 5. An apostrophe in the summary displaying as a “1”; 6. Thick grey line around all text was too heavy and was removed and changed for a 3-d look; 7. Blue used in title bar different colour from blue in index—they were supposed to be the same; 8. The wrong red was applied to the RMIT University logo used in opening; 9. Incorrect screen captures; 10. Section missing: “How to Use”; 	<ol style="list-style-type: none"> 11. Logging In: No animation; 12. Sound: one sound file reused; 13. Mismatched text and voice-overs; <p>Interactivity Issues</p> <ol style="list-style-type: none"> 14. Error loading interactive sometimes; 15. Can not jump ahead and select options in left contents; 16. Slow downloading on modem; 17. With sound turned off, orientation does not progress. This was how the developer designed it, but not how I wanted the outcome. This was modified after much discussion; 18. Slow to start; stops when moves to case study; 19. Technical requirements: No animation, need to break up text; 20. Learning Hub: Stops part way through; 21. Non-active links.
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Members of the reference group reviewed and tested different versions of the Orientation, also reviewed it with their students and provided feedback. The product went through ten iterations before it was finalised.

5.6 D. Observing the design

1. Planning -> 2. Developing -> 3. Implementing -> 4. Observing -> 5. Reflecting

The effectiveness was assessed by feedback from a team of RMIT staff members involved in the design of the project and by the success and acceptance of the end result. The end result was well received by the University and was distributed to 15,000 first year students and 3,000 full-time staff members with 2,000 prepared for casual staff and industry. The Orientation was also the Third Prize Winner for the 2001 competition, Australian Society for Technical Communication (Victoria) Technical Writing.

A group of RMIT staff came in to review the animation plus other aspects of the new online learning platform. Feedback is shown below:

Feedback on Online @ RMIT Orientation from the group who came to see Blackboard Seminar 2/12/99

- Overall feedback was that it was very good;
- Font could be too small;
- Concept is great; and
- The fact that the spoken text was not the same as the onscreen text was good as they reinforced each other.

5.7 E. Reflecting on the design and design activities

1. Planning -> 2. Developing -> 3. Implementing -> 4. Observing -> 5. Reflecting

5.7.1 General project reflections

The first set of my reflections is about the design process:

- In brief, understand the audience—this is key. The concept of audience is complex and has received much focus in literature over time. The next section 5.7.2 explores this concept in more detail;
- With a large team, the storyboards and scripts were important for communication and for the group to have a similar understanding of the end product;
- Allow the developers creative time to achieve the result they require. Ensure this is built into the timeline;
- Create a prototype of the interface early on so designers know exactly how much screen ‘real estate’ they have to work with;

- Time the voice early and apply to the iTour to ensure the voice recordings are not too long. The Orientation was twice as long as originally planned due to all the spoken words;
- The voice-overs may vary if there is a change to the text made after all the voice recordings were done; and
- Expect the unexpected. For example, each iTour had a slight variation that I was not expecting; however, that did not detract from how they worked.

The second set of reflections is about the design of the interface:

- Provide the user with clear navigation and instructions on the navigation;
- Have a default mode where the animation can run unattended, but allow control so the user can stop;
- Ensure that voice and text are similar, but they do not need to be identical; and
- The Orientation will run through from start to finish if the user cannot use the mouse; however, it would have been beneficial to users who can only use the keyboard, to provide them with keyboard entry. Not everyone can use a mouse, so not providing control via the keyboard was a mistake.

The third set of reflections is about testing the outcome:

- Frequent testing and reviewing output is important to identify mistakes or different approaches. For example, I had anticipated that the stop button would stop the sound and the animation, but the developer thought it should only stop the sound and not the animation. I learned one cannot assume that the members of the team will think the same way, therefore careful specification of the design followed by frequent testing and reviewing are important.

5.7.2 Further reflections on the concept of audience

This section reviews major contemporary views regarding audience (Coney 1987; Cooper and Holzman 1989; Coney 1992; Blakeslee 1993; Houser 1997; Dayton 2003; Bartell 2005), to better understand the concept of audience, its meaning for technical communicators and its use within this iTour project. First, I will present wide-ranging views from positivism to new rhetoric, social constructionism, and expressive rhetoric. Second, I will discuss the implications for the project.

In order to provide technical information for an audience to assist them in performing specialised technical tasks, technical communicators must know as much as possible about

their audience including their needs, expectations, limitations, tasks they are performing, and tools they are using.

The audience refers to both “the real and the imagined readers (users) who use texts (products) to do something in their own environment...In technical communication, the main trait that our audiences share is that they are trying to do their jobs using our products” (Houser 1997).

Some contemporary authors draw on underpinning philosophical views. For example, Comte established the doctrine of Positivism in the 19th Century. In *The Positive Philosophy*, published in 1855, Comte argued the basic tenet that “there is no real knowledge but that which is based on observed facts” (Comte 1974 reprint, p.27). He postulated that the reader wants knowledge but has no influence on writing; information is transferred via writing from the sender or author to the receiver or audience; the writer must follow logical methodologies and laws that can describe the world (Kolakowski 1968; Kolakowski 1972; Comte 1974 reprint; Bryant 1985).

New Rhetoricians including Perelman, Olbrechts-Tyteca, Burke and Booth collectively argue for intellectual and social equality between the writer and their audience. They believe that the text provides common ground on which ideas could be reviewed honestly and openly (Booth 1961; Burke 1962; Perelman and Olbrechts-Tyteca 1969; Coney 1987; Coney 1992).

This approach continues with Cooper and Holzman (1989) who view the audience as “real readers” (p.11) and invite their involvement in improving the understandability of a document by sending them text, asking for feedback and, if appropriate, revising the text based on that feedback. Blakeslee (1993) also highlights the importance of the writer knowing the people for whom they write, and following a peer review approach. Park (1982) identifies the audience as a real entity but clearly external to the user; “a defined presence outside the discourse” (p.248).

Within the contemporary social constructionism view, technical communication does not reside in the text or media itself but is socially constructed by the user and their community. The social constructionist view based on the work of Berger and Luckmann (1966) is an epistemological position that aims to account for the ways in which phenomena such as knowledge are socially constructed (see Larkin 2005). Fish (1989) believes that the reader’s community plays an enormous role, as the interpretation of the text’s meaning occurs in the context of their “interpretive community” (p.83) rather than within the individual reader, or the text itself. Interpretive community is defined as a group with a shared point of view and a shared way of organising and categorising experience (ibid.). LeFevre (1987) states that even

when working alone, authors and their “socioculture are co-existing and mutually defining” (p.35).

The terms ‘social constructivism’ and ‘social constructionism’ may be confused if interchanged. Social ‘constructionism’, originating from the research of Vygotsky (1978) and often associated with Latour and Woolgar (1986) among others, is a variation on cognitive constructivism emphasising the collaborative nature of learning (see Dougiamas 1998; Campa 2005).

In order to differentiate social ‘constructivism’ and ‘constructionism’, Young and Collin (2004) define the two terms as:

The former [social constructivism] focuses on meaning making and the constructing of the social and psychological worlds through individual, cognitive processes while the latter [constructionism] emphasizes that the social and psychological worlds are made real (constructed) through social processes and interaction.

(Young and Collin 2004).

The constructionist approach adds to the constructivist viewpoint (Shaw 1995). With constructionism, not only is the knowledge constructed socially but is established through the construction of an object (Papert 1990; Papert and Harel 1991).

Papert explains:

...‘constructionism’ as including, but going beyond, what Piaget would call ‘constructivism.’ The word with the v expresses the theory that knowledge is built by the learner, not supplied...The word with the n expresses the further idea that this happens especially felicitously when the learner is engaged in the construction of something external or at least shareable...a sand castle, a machine, a computer program, a book. This leads us to a model using a cycle of internalization of what is outside, then externalization of what is inside and so on.

(Papert 1990, p.3)

In this Exegesis, I do not use the terms ‘constructivism’ and ‘constructionism’ interchangeably but use ‘constructionism’ as defined by Young and Collin (2004) then extended by Papert (1990).

In tandem with social constructionists, Expressivist Rhetoricians say that the most important audience for the writer is the self (Murray 1982; Elbow 1987). The view of these theorists is that writers are self-sufficient, and that audience awareness could be disruptive to the writing. Elbow (1987) advises to write for oneself first, then refine for the audience. Murray (1982) suggests self-monitoring the writing—before it is made, while it is being made, and after it is made. He advises that the writer has within themselves a peer-group: the writer and the “reading-writer” who responds to the writing (Murray 1982, p.142).

A range of contemporary views is presented next, to illustrate the field. Perelman and Olbrechts-Tyteca (1969) and Ong (1975) advocate that successful writers can imagine their audience. Ong (1975) proposes that this is learned from “earlier writers who were fictionalising in their imagination audiences they had learned to know from earlier writers” (p.11). Ong also emphasises the importance of understanding the “degrees of admissible ignorance” (ibid., p.19) or those areas that a reader does not know, in order to publish successfully.

The fictionalised audience is a topic of interest for many theorists. Berkenkotter (1981) states that writers not only imagine their audience, but revise their writing as the features of the audience “become more distinct” (p.396). Pfister and Petrick (1980) support fictionalising the audience, but recommend making it as close to the real audience as possible. Long (1980) asks not “who is my audience?” but “who do I want my audience to be?” (p.225).

Burke (1962) argues that the act of writing involves dramatic role playing. Hirsch (1977) extends the “imaginary projection” (p.28) of the reader to the writer, stating that the writer should role-play so that writer can think of himself (sic.) as he wants the audience to think of him. Flower (1988) posits that the writer should imagine himself in both roles and also should think of himself talking to the reader.

In contrast to the ‘reader’ of fiction, Coney (1992) notes the emerging distinct persona of the ‘user’ in technical documentation rather than the reader, as the reader is “transformed by the very act of reading into a more sophisticated chooser of options” (p.61). Dobrin (1983) defines technical writing as writing that “accommodates technology to the user” (p.243) and so refers to the reader as user because the technology is meant to be used. Dobrin says that the user does not have universal knowledge of language and what the writer writes is “indeterminate and can never be precisely understood” (ibid., p.234).

Coney and Steehouder (2000) argue that web authors should communicate through personas and agree with Cooper (2004) on focusing their attention on designing one “fully realized, thoroughly defined user persona” (ibid., p.129). Their definition of ‘user persona’ includes all roles taken on by users, and all attributes of the users. Cooper (2004) also suggests that naming the persona is very important, so that the persona is considered as separate from the writer or designer and becomes a “concrete individual” (p.128) in their minds.

All of these contemporary views are important because they inform the way technical communicators can approach ‘audience’. For example, Schriver (1997) identifies three methods of analysing audiences. The first method is classification driven, where the writer creates audience profiles. The second is writing intuitively for the audience, using their

imagined view of the audience to guide decisions. The final method involves real audiences and collecting feedback from the audience on the writing through methods such as usability testing.

The traditional view of audience within technical communication has been that potential readers or users exist outside the text. Major efforts have been directed towards analysing readers/users with a bias towards identifying the audience demographically, investigating their information needs, levels of experience, and so on. The emphasis has been on ensuring that texts were written clearly to the correct type and level of reader (Coney 1987; Houser 1997). In the 80s and 90s, social construction influenced technical communication by emphasising both the active role of the reader in creating meaning, and the collaboration between writer and reader (Berger and Luckmann 1966; Houser 1997).

Within this iTour Project, the concept and treatment of audience is similar to that described in Schriver (1997) with steps taken within each project to move away from treating the audience as an external entity, and to move progressively closer to the real audience. The approach evolved over time.

In Sub-project 1, I commenced using a classification-driven approach to analyse the audience and relied on my intuition for putting myself in the situation of the audience. I fictionalised the audience (see Ong 1975), but was also part of the audience, being a student at RMIT myself. I discussed the audience in depth with other staff and students, attempting to make it as real as possible (see Cooper and Holzman 1989). I imagined myself in the role of the student documenting my own process to learn the same software that other students would have to learn (see Hirsch 1977).

In Sub-project 2, I identified the audience, analysed their biographic and demographic information, and grouped them by student and staff. I then went on to create an imaginary audience as close as possible to the real audience by working on the sub-project with members of the audience and establishing committees of audience members who could provide input and feedback (see Cooper and Holzman 1989; Blakeslee 1993). In Sub-project 2, I managed to establish a closer connection and stronger understanding of audience than in Sub-project 1.

The concept of the audience is both complex and nuanced, as reflected in the literature and within my PhD Project. As Houser (1997) articulates, technical communication audiences are considered as both real people and as imaginary constructs in the mind of the writer/designer, and the relationship between the two constantly changes throughout the design and writing process.

5.7.3 Further reflections on voice models

This section provides further reflections on whether a professional voice model should be used, or local staff members who understand the project content. Using staff as voice models means they understand the concept being described; however, one may have to do many 'takes' before achieving the required outcome.

When creating an iTour with voice-overs, the project manager can choose between using a professional to do the voice-overs, or a local staff member who understands the subject matter. The voice work should show "clear diction, energy, and range of intonation." The quality of the voice is not so important as the ability to convey emotion and the delivery of content by the voice model (Apple Computer Inc. 1994, p.27).

Other reasons for choosing a professional voice model are:

- The models are familiar with, and are not made nervous by, the sound room, and so will do the recording more quickly and are less likely to frustrate the sound engineer;
- There is a wide range of voice types from which to choose; and
- There is a better chance that the models will be available in the future.

There are several reasons for not wanting to use the services of a professional. First, if the project has limited financial resources the project manager may "decide that a professional voice over is not as important as producing high quality animation" (Anderson 1994, p.423). At the time of producing the Orientation, professional voice models were \$A200 per hour. This fee could result in a significant cost that may preclude the option of having a professional model.

Another reason for not choosing a professional would be if the subject matter were too technical or from an area the professional voice artist does not understand. Barfield (2004) says that "someone talking communicates far more information than just what they say. The subtle variations in pronunciation, word usage, speed and tonal qualities can sometimes impart more than the information content of the words" (p.109).

The advantage of using a staff member from the team or one who understands the concept and is interested, is that they may be able to convey more interest and authority via their voice-over. If choosing a professional voice model, it would then be important to test several models or request one with an appropriate level of understanding of the topic. This may facilitate conveying the information accurately.

However, when choosing a voice artist, it is important to consider not only the speaker's voice qualities like diction and attitude, but also that the product and voice should appeal to

its audience. Whether choosing a professional or a local staff member, the project manager should be sure the final voice reflects the “content, the audience and the project’s purpose” (Apple Computer Inc. 1994, p.192). The project manager should consider the gender, age and accent, as these may be important to the intended audience. With the RMIT Orientation, local staff members and students from RMIT University provided the voice-overs.

5.8 Outcome

The research was exploratory using a design action case approach, which included one main design cycle to design, develop and test Sub-project 2: Online @ RMIT Orientation with iTours. Data were collected via a diary and communication exchanges with the designer; the resulting different versions of documentation and animations; and my reflections as a researcher.

Formative evaluation occurred along the development cycle in the form of: verbal project briefings and product demonstrations to DLS management and team, to the University academic IT committee, and to the reference group; regular meetings with the DLS Manager and with the reference group to reflect on design and testing progress and issues; and results of progress and feedback on the Orientation were recorded in my diary, with reflections on the activities.

Summative evaluation for this sub-project included acceptance by the University of the RMIT Orientation for a CD presented to all (15,000) first year students and all academic staff; a final presentation to the reference group; a demonstration of the Orientation to 20 RMIT staff members and solicitation of their feedback; a final report describing the activity for review; and an in-depth peer review that the Orientation underwent when submitted to the Society of Technical Communication awards, for which it won third prize.

Validity was incorporated by using the eight possible ways described by Creswell (2003) and explained in the Methodology chapter, page 29, highlighted as follows. The outcome was checked for effectiveness by the reference group, by the team who compiled the CD for distribution to 15,000 students, and through feedback from the student tester; the findings were reviewed with the multimedia developer to ensure their accuracy; this chapter provided a form of rich, thick description of the process and findings; I pointed out negative aspects such as issues with development and accessibility; I spent prolonged time in the field immersed in the project; I used a peer review process with the Australian Society of Technical Communication to review the design outcome; and I reviewed the research with the research supervisor who was new to the research project and so was able to act as an external auditor to the process.

Rigour was ensured by following all seven key strategies advocated by Baskerville and Wood-Harper (1996) and Baskerville (1999) which are described on page 32 in this Exegesis. They include using design action research, which was appropriate to this type of research; the research was valid research; participants who worked on the project were informed of the research; data collection was planned through diaries, reports, result of competition, and production of design; careful collaboration was maintained with other participants; the action research was cyclical containing one major cycle; and generalisations were made and documented in this chapter.

5.9 Key findings

The following were key findings resulting from the design and testing of Sub-project 2:

1. Design team members may interpret the iTour design and testing requirements differently. To prevent this, the following is required: careful documenting and prototyping of requirements; frequent two-way communication with the team; and frequent checks on the design, development and test progress and results;
2. If the length of the iTour (in time) is important, then work out time that can be allowed on each section and what this means in terms of number of words and text boxes displaying on the screen; and ensure that everyone follows this metric;
3. Test the sections with voice by recording the voice on computer then listening to the outcome and timing it. This is an inexpensive way of testing the length and content of the voice-over before the final recordings;
4. Redesign is a useful way of finding design ideas. Find other web interfaces or iTour examples and use them to influence the design;
5. Functionality, interface and platform testing are important to the success of the iTour. Test every feature and every word of each release; test all features and functionality; and test on all the computer environments on which it is meant to run. Test early and test often;
6. The lead designer should be significantly involved in the testing all through the project, so they can ensure that the design outcome is as they envisaged;
7. After designers are provided with information on requirements, they should be given the freedom and time to design;
8. Ensure that the navigation control buttons permit the user to move around the animation; and the buttons themselves can show states such as whether the animation has been paused;

9. In the iTour animation, it is effective to use coloured semi-transparent highlights to focus the user's attention on different parts of the screen, as an alternative to using a cursor to point out the area of focus;
10. If voice-overs are required, then local staff involved with the project can be used, or professional voice models. For a further discussion on the types of models to use, refer to 5.7.3 Further reflections on voice models, on page 75; and
11. Designers following a truly user-centred design approach for the first time, not only require instructions or guidance on how this can be achieved but will benefit from consideration of the complexities of the audience. See 5.7.2 Further reflections on the concept of audience, on page 70.

From these findings resulting from the Online @ RMIT Orientation we will now explore the first analysis of three iTours, which was conducted in preparation for the Online @ RMIT iTours Sub-project 3.

6 Analytical Review 1

6.1 Introduction

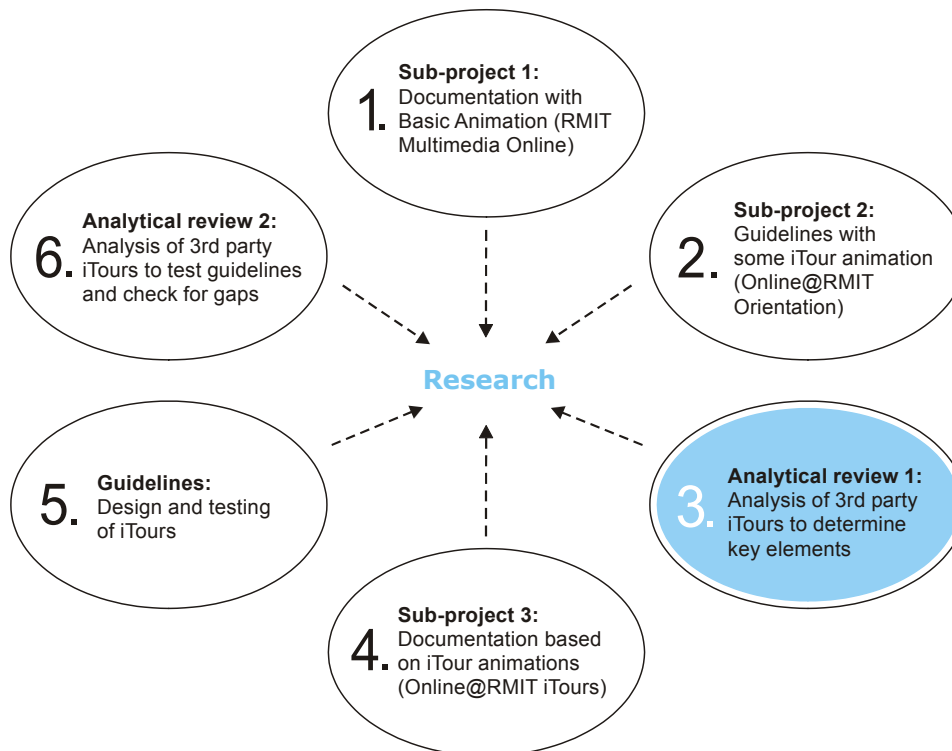


Figure 18: Research activities emphasising Analytical Review 1

When preparing to design the Online @ RMIT iTours, which is the next sub-project documented in this Exegesis, I analysed three different iTours identifying and documenting the components. The first was from the previous sub-project, the RMIT Orientation; the second, from an Australian banking site, Westpac; and the third, from help available in 1997 with an HTML authoring product Macromedia Dreamweaver. The analytical review provided an opportunity to reflect on the composition of the iTours.

I examined the three iTours slowly, systematically and closely as described in the next section.

6.2 Analytical Review 1A: Orientation Learning Hub iTour

The Learning Hub iTour within the RMIT Orientation was the first iTour analysed. Each section was named (Sub-heading), the activity was identified (Activity), and the text

displayed (Text). The action of breaking the iTour down into components assisted me to closely explore design and review the composition.

This was the information included in the review:

Provides a tour of the Learning Hub; is supported by text which is almost identical.

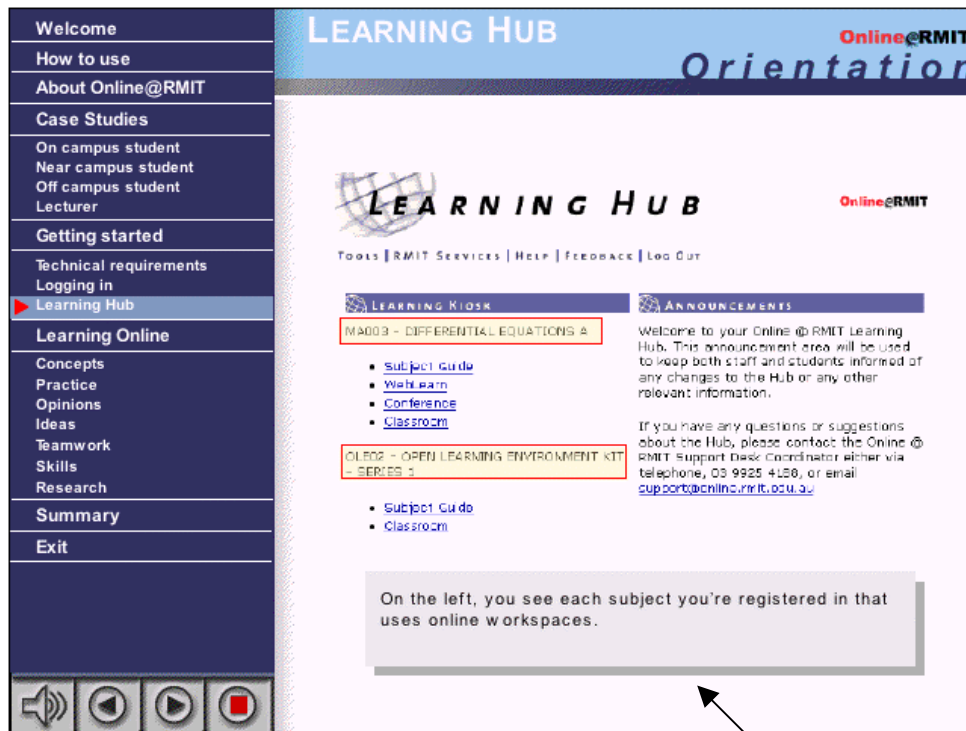


Figure 19: Orientation Learning Hub interface

Style: Text bubble appeared to describe a particular part of the screen then was removed before the next text bubble displayed. All text supported by sound.

Table 15: Deconstruction table – RMIT Orientation

Sub-heading	Activity	Text
Introduction	Show learning hub	After you log in, you will see the Learning Hub. This is the Online@rmit gateway to the RMIT online learning resources.
Subjects	Highlight subjects	On the left, you see each subject you're registered in that uses online workspaces.
Tools	Highlight tools	Under the subject you see a list of online resources. (To open a resource, such as <i>Classroom</i> , just click on it.)
Announcements	Highlight announcement	On the right side you see Online@RMIT <i>Announcements</i> .
Menu selection: Tools	Highlight tools	<i>Tools</i> provides a link to tools available to help you use the Learning Hub.
Menu selection: RMIT Services	Highlight RMIT Services	<i>RMIT Services</i> provides a link to staff and student services like the library and bookshop.
Menu selection: Help	Highlight Help	<i>Help</i> tells you about the Learning Hub and describes how to use it—but it is pretty easy to use without this.
Menu selection: Feedback	Highlight Feedback	<i>Feedback</i> is for you to send in any problems you are having, or to give feedback.
Menu selection: Logout	Highlight Logout	Use <i>Log out</i> to exit from Online@RMIT, so no one else can access your online work.

This analysis was the first one undertaken in this Project and is the start of a process to closely explore the composition of each step studying the features that make up each one used in the iTour.

6.3 Analytical Review 1B: Westpac Bank iTour

I found this Westpac online banking iTour exemplary in its simplicity and was inspired to examine it more closely. This analysis sub-divided each area into four sections:

1. Sub-heading to describe the activity; for example, page overview;
2. Activity; for example, text bubble appears in upper left hand corner;
3. Information about the demonstration; for example, a description of the activity being demonstrated; and
4. Type of activity; for example, descriptive.

With this analysis I found that the interface could have more than one text box on the screen at one time and the text box could have arrows, which point to the part of the interface being demonstrated.

This was the information included in the review:

Animations automatically start when the web page opens with the animation displayed. The animations are used to provide a guided tour of Westpac.

Account List: Provides information on the functionality of the Account List page.

Size: 25KB

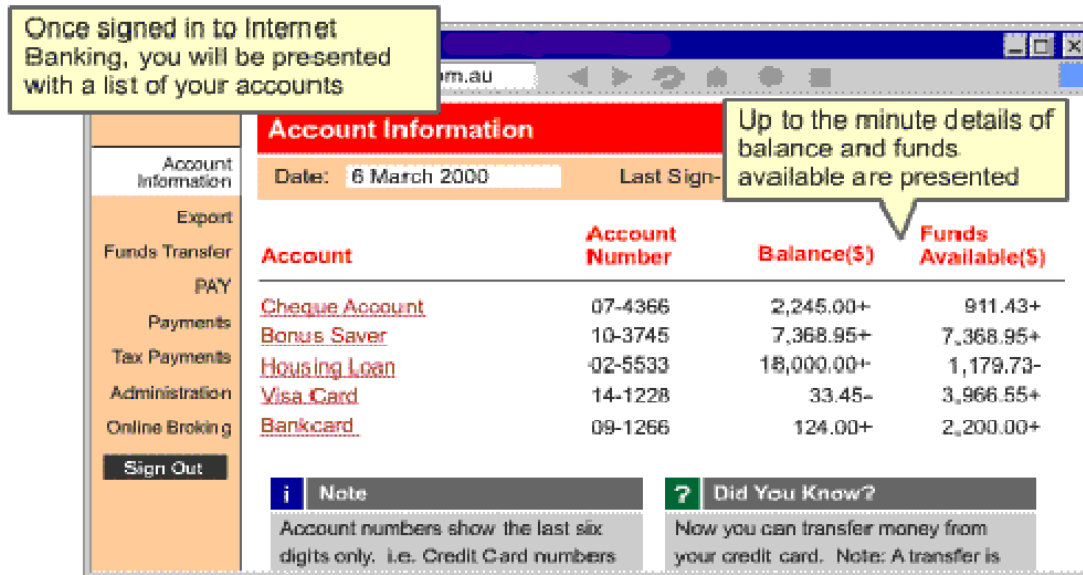


Figure 20: Westpac Bank iTour Example

Style: Text bubble appeared to describe a particular part of the screen; text bubble is not removed. Maximum number of text bubbles on the screen: 4.

Table 16: Deconstruction table – Westpac iTour example

Sub-heading	Activity	Text displayed in iTour	Type
Introduction	Show account list page	Display an example of the page but no accompanying descriptive text. Not even a heading. Problem: the page should have a heading. If using navigation buttons to progress to the next page, difficult to work out which screen one is looking at.	Descriptive
Page Overview	Text bubble appears in upper left hand corner	Once signed in to Internet Banking, you will be presented with a list of your accounts.	Descriptive
Balance Description	Text bubble appears over accounts	Up to the minute details of balance and funds available are presented.	Descriptive
Account Description	Text bubble appears pointing at the accounts. “Try it now” is a link.	A list of transactions can be displayed by simply clicking on the account name. Try it now.	Descriptive Instructional
Navigate to next animation	Text bubble displays pointing at navigation buttons (off animation—clever)	Click to continue.	Instructional

Some observations of this tour were that it used pale yellow text boxes; no punctuation on the end of last sentence; future tense; text boxes size approximately six words wide, and three sentences deep; text boxes contained within the animation and not placed around it; text boxes point to areas of focus; at the end of the iTour a Replay button displays; the iTour screen was reduced in size, which makes some of the smaller screen elements more difficult to read; text minimal.

I liked this iTour immensely at the time as it was very simple to use and very concise. The only feature that I thought I would change was the tense used in the text boxes. For example one of the Westpac text boxes displayed “Once signed in to Internet Banking, you will be presented with a list of your accounts.”

As recommended by Hackos and Stevens (1997) for documentation writing, I prefer to “use simple sentences, active voice, and present tense” (p.290). This is also supported by Horton (1994) by example; he does not provide a rule on tense only voice, yet his examples for this section are all in the active voice and present tense e.g. “Select an option”, “The program sorts...” (p.266). I find that the “present tense brings clarity and immediacy to describing a

process or procedure” (Nickerson 1999) and, as documented in the Microsoft Manual of Style for Technical Publications, 3rd edition, “in technical writing, present tense is easier to read than past or future tense” (Candib 2003).

6.4 Analytical Review 1C: Macromedia Dreamweaver iTour

Software company, Macromedia, released animated help to accompany its HTML development software. I reviewed this help, and this time I divided the analysis into two sections:

1. The first section provided general information about the whole animation. Information included purpose; sound; how the animation commences, including a description of what is shown and what the user must do to start the animation; and navigation.
2. The second section provided information on the specific parts of the animation including the following:
 - Activity identification;
 - Name of activity; for example, Introducing Document Window;
 - Description of the text box activity that the user sees; for example, text box moves closer to the document window;
 - Description of the rest of the demonstration; for example, the Document window displays the current document approximately as it will appear in a web browser. Working in the Document window is similar to working in a word processor;
 - Type; for example, descriptive, informative and instructive; and
 - Action required of the user; for example, click next.

As the overall iTour is long, here are two excerpts from the review:

Table 17: HTML Development Software iTour deconstruction – A

Version	Description
Purpose	The animation is used to provide a guided tour of different features of the product.
Sound	Yes: mouse-clicks and typing sounds.
How animation commences Level 1	When the selection is chosen: Workspace, a dialogue box displays describing the feature, and the arrow next to “Show me” flashes. The user must click the arrow to begin. This is level 1 of the animation.
Level 2	If you move the cursor over the screen sample, dialogue boxes pop up describing different parts of the screen. For example: “The Property inspector displays properties for the selected object.” Line displays again if one moves the cursor over the object at bottom of screen.
Level 3	Parts of the screen not being spoken about fade away—the relevant section remains clear. Text box points to relevant section and displays information. Select Next to see the next animation. Description follows in next table.
Navigation	Select Start ; to progress to next part of animation select Next , or select Back to go back to start of the previous step; Exit to exit. Re-select in Index on left of screen to start again.

Table 18: HTML Development Software iTour deconstruction – B (excerpt)

	Description	Activity	Text	Type	User Action
7	Object Palette	Both Windows become blue. Text window points to Object Palette	The Object palette contains buttons for creating various types of objects such as images, tables, and horizontal rules...	Informative	Click Next
8	More info provided in Object Palette	Vertical menu of icons comes into view; more text added to text box; text box points to top icon	<i>Previous text displays plus the following:</i> ...Clicking on a button creates the specified object at the cursor location.	Instructive	Click Next

6.5 Outcome

There were two main outcomes from the first analytical review of three iTours. The first outcome was the resulting analysis and documentation on the three iTours and the knowledge I gained from this activity. The second outcome was the decision to base the design of the next set of iTours on the Westpac banking iTours. The new design would also draw from the RMIT Orientation iTours.

Another outcome was the commencement of a process for ‘deconstructing’ the iTour interface to better understand its features. Important to this process was both the act of recording the composition of the screen, as well as organising this information for later reference in tables and with screen captures.

6.6 Key findings

There were three key findings resulting from this analytical review:

1. The iTour interface analytical review became more comprehensive and detailed with each completion. This was a positive outcome resulting from learning what to record and how to record it, as well as noticing more categories of interest to document.
2. The analysis of the Westpac banking interface found it to be simple, providing minimal input and the use of multiple text boxes displaying one at a time with arrows pointing at the focal point, which I found appealing.
3. There was no control of the iTour while it ran. When it finished the users could replay it. Removal of the navigational controls appeared to simplify the iTour interface and interactivity.

Building upon the ‘deconstruction’ of the three iTours, I was preparing to start a new sub-project to develop a suite of iTours. This part of the journey is presented in the next chapter.

7 Sub-Project 3: Online @ RMIT iTours

7.1 Introduction

In 2000 I decided to provide an alternative to text-based user documentation for the RMIT University online learning system (Online @ RMIT), through creation of animated interactive software tours (iTours). These tours were designed to introduce students to Online @ RMIT, showing them thirteen activities they would find useful if new to online learning. Activities demonstrated included taking a quiz, joining in a discussion group and participating in an online chat session.

I chose to develop this set of iTours as after three years of working on the online learning platforms at RMIT I found there was a requirement to provide students with animated documentation, to match the leading-edge animated content that was being prepared for students within Online @ RMIT.

This iTour sub-project became the third sub-project and fourth major activity for this research as shown in the diagram below:

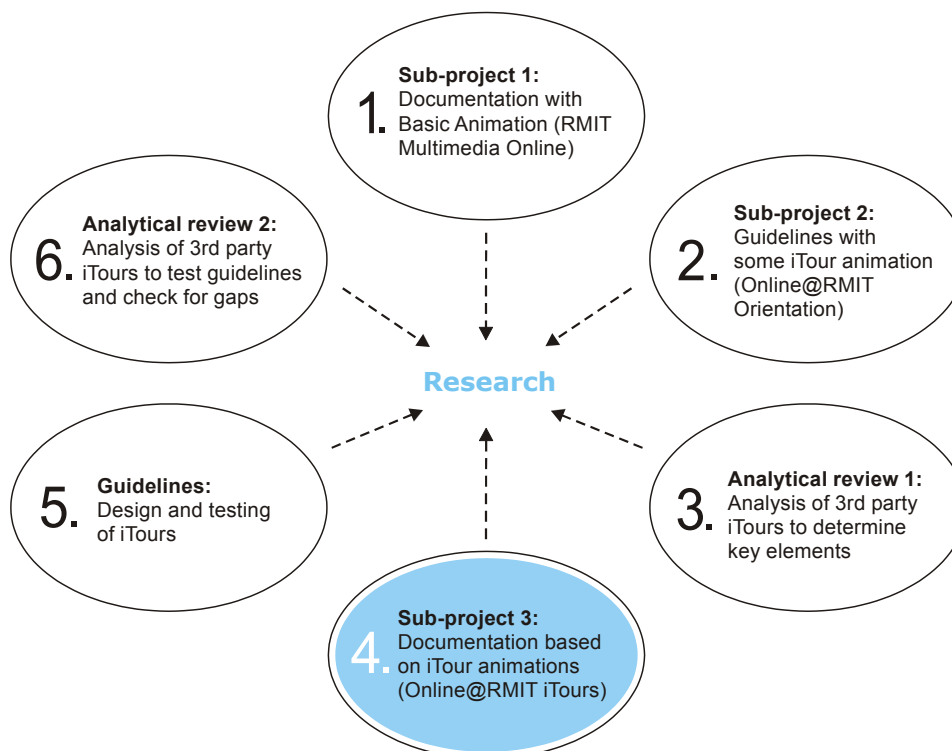


Figure 21: Research activities emphasising Sub-project 3

In the research, my role was the design action researcher as per the previous sub-projects. In this chapter, I describe the three iTour versions that were released. In Version 1, I took the

lead in this activity; in Versions 2 and 3, I worked with a development team who provided design guidance. As in previous projects I designed and managed the testing, and I analysed the results. I had assistance in running the test, as I required three test facilitators to triangulate the results.

7.2 Cycle 1: Online @ RMIT iTours (Version 1)

Each version of the iTours was developed during its own design cycle. Cycle 1 produced Version 1; Cycle 2, Version 2; and Cycle 3, Version 3. This section describes the production of Version 1 during Cycle 1. The diagram below provides a description of the first design cycle:

Cycle 1: Online @ RMIT iTours Version 1

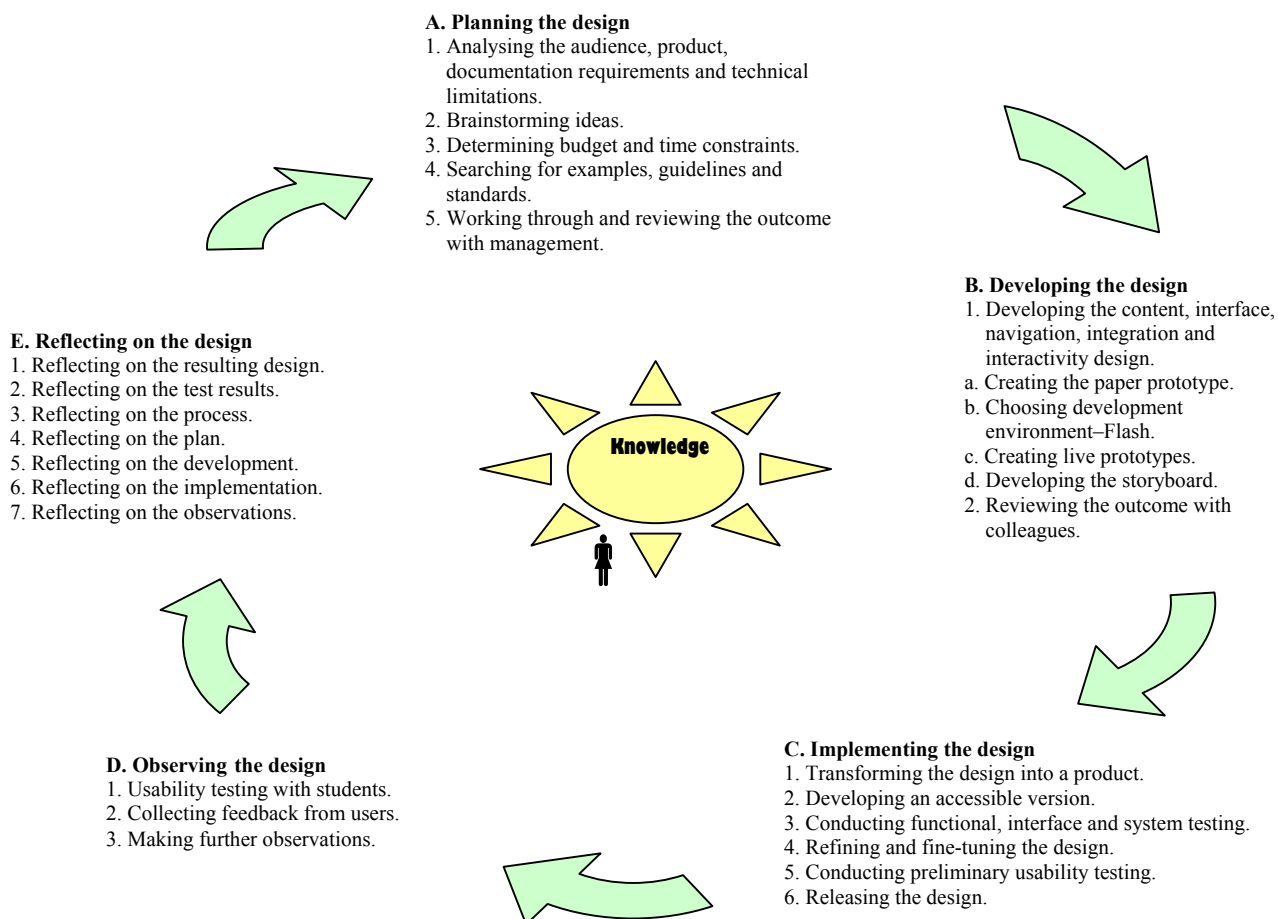


Figure 22: Online @ RMIT iTour Version 1 PDIOR design cycle

7.2.1 A. Planning the Design

Cycle 1: **A. Planning** -> B. Developing -> C. Implementing -> D. Observing -> E. Reflecting

1. I identified the product to document—in this case it was those sections of the Online @ RMIT platform that students would be most likely to use;
2. I identified the type of documentation required—iTours that were introductory and procedural in nature.
3. I identified the audience, including who they were and what they needed to know. The audience was RMIT students, who were new to online teaching and learning but not new to using the Internet.
4. I identified technology constraints—students would be bound to the minimum specifications recommended for Online @ RMIT (56K modem, Netscape Navigator 4.6 or MS Internet Explorer 4.01 with Service Pack 2 on a Macintosh or PC).
5. I brainstormed ideas with three staff members—the first provided training directly to students and staff in using Online @ RMIT; the second was responsible for support of all RMIT staff and students who used Online @ RMIT; and the third person was the DLS Manager who was also a lecturer in usability. The ideas encompassed what to document, and how to document it. We also reviewed the planning I had conducted to date.
6. I prepared a plan that included a description of the audience, goals, content overview and estimated cost, in order to interest the DLS Manager and the rest of the DLS team in this project.

Instructions	For an example of the plan, go to the iTour Project web site; select Sub-project 3 then Preliminary plan .
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7. I searched for examples of animations in which aspects of the design could be applied to an iTour. Interesting examples included an animated tour of Westpac, an Australian online banking site; HTML help software animated introduction; and the original Online @ RMIT Orientation.
8. I reviewed the plan for the animation, plus the budget with the DLS Manager, from whom I secured funding for the project.

The following are my early notes on initial specifications:

Initial Specifications

Objective: In 5 minutes or less, want to describe Online @ RMIT to students. Not at a theoretical level, but at a basic level.

Audience: RMIT students, young and old; sight impaired; hearing impaired.

Maintenance: Want DLS staff to be able to maintain DLS Tour, for example by changing text and screens.

Lookup: (Previous) Copyright issues with copying screens? No, went through this exercise with the documentation and all companies agreed that we could use.

Navigation: Forward and back arrow on each screen, heading on each page and small description, list of headings down left with one menu selection where the focus is highlighted.

Design: Simple like Westpac but sophisticated like MAC OS. Ensure to show cursor moving.

At the end of this phase, I had established that the iTours would contain the following:

Planned iTour Overview

- Tour introduction
- Information on Logging in
 - Who can log in
 - How to log in
 - What to do if you can't log in
- Information on the Learning Hub
 - Description
 - Tour of Learning Hub
 - How to access course and program links
 - Information about your email address
 - Information on logging out
- Information on CourseInfo (Classroom)
 - Description
 - Information on reading course content, sending assignments, joining in a discussion, doing a quiz, checking a grade
- Information on WebBoard (Conference)
 - Description
 - Information on reading messages, replying to a message, chatting
- Information on Assessments, Questionmark and (later) WebLearn
 - Including how to take a quiz using the Questionmark tool
- Summary including a site map of features

7.2.2 B. Developing the Design

Cycle 1: A. Planning -> **B. Developing** -> C. Implementing -> D. Observing -> E. Reflecting

This section describes the second phase in which the design was developed to the prototype and storyboard stage.

I commenced this phase with the area that I knew best: content design. First, I decided what information to provide for each animation. Next, I attempted a more detailed design by preparing a storyboard. I could not complete this, as I did not know how to describe a moving animation.

I then decided to try a different approach to storyboarding by first analysing three animation examples more closely, then documenting how they worked. This permitted a close examination of the examples, focusing on their content and composition. This deconstruction is described in the previous chapter called Analytical Review 1, on page 79.

With this deconstruction process, I was able to focus in fine detail on actual examples that were in production. Through this process I was able to establish an appropriate design framework to follow. For example, I was able to examine the voice, tense, when and where movement would occur, how text would interact with the screen, and the number of different demonstration screens required.

From this analysis I was then able to create a low-fidelity or paper prototype:

- Using a copy of the screen of each Online @ RMIT interface that I was attempting to document;
- Cut and pasting this to a document, one screen per page, where I added orientation text and proposed navigation icons;
- Printing the outcome in colour so I would have a more realistic hard copy on which to work;
- Using Post-It notes, scissors and pencil to design the text boxes and their content; and
- Writing the movement and steps on the design page.

Figure 23 shows one page of prototyping with planned navigation, text boxes, demonstration screen and proposed actions. For a complete example, see the iTour Project web site.

Instructions	To find the complete prototype example for one iTour, go to the iTour Project web site then select Sub-project 3 then Low-fidelity (paper) prototype 1 .
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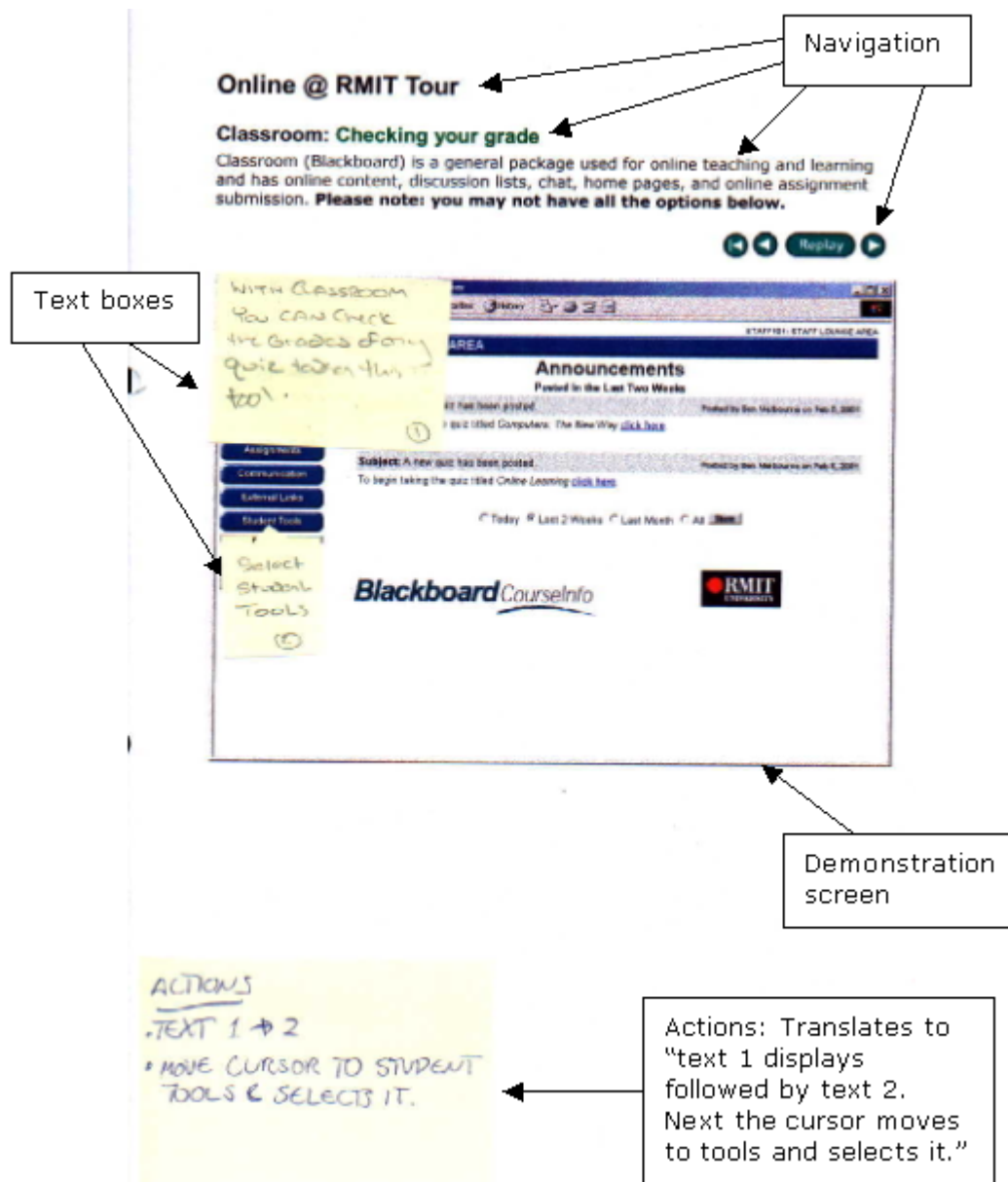


Figure 23: Online @ RMIT iTour paper prototype

As I was developing the paper prototype, I was able to establish the following:

- The interface would consist of the copy of the screen being demonstrated, as well as text boxes, orientation text, navigation buttons, and the cursor to highlight activity and areas of interest;
- The navigation would consist of a Replay button, as well as buttons to control movement between animations and return to the home page;
- With the interactivity, only the navigation buttons would provide interaction; and

- With integration, the sequencing of events would be as follows:
 1. First the introductory text would display with an overview of the animation;
 2. Then a text box would display saying the menu item to select;
 3. Then the cursor would select the menu item—a mouse-click noise would accompany any selection; and
 4. For each demonstration after this, the text box would display first; then if activity were to occur, it would do so after.

As I was designing the iTours on paper and they were becoming a concrete entity in my mind, I was able to make the following decisions:

- The iTours would be short, approximately one minute or less, and simple;
- They would lead a student through a task by showing an animation of that task, complete with mouse-click noises, supplemented by descriptive talk bubbles. The iTour included moving cursors to relevant points on the screen to highlight areas of interest and, where appropriate, show text being typed into fields;
- The iTours would be embedded within a web interface; and
- The iTours would not use voice. I made this decision given time and budget constraints for this project, plus my interest at the time in exploring and testing voiceless iTours. To ensure accessibility, text and graphic documentation based on the iTours was developed. Students would have a choice of using either type.

I provided the paper prototype to the DLS team graphic designer, who produced the first high-fidelity prototype using an animated gif.

Instructions	To find the first high-fidelity prototype, go to the iTour Project web site then select Sub-project 3 then High-fidelity prototype 1 .
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This is a two-dimensional image of the high-fidelity prototype:

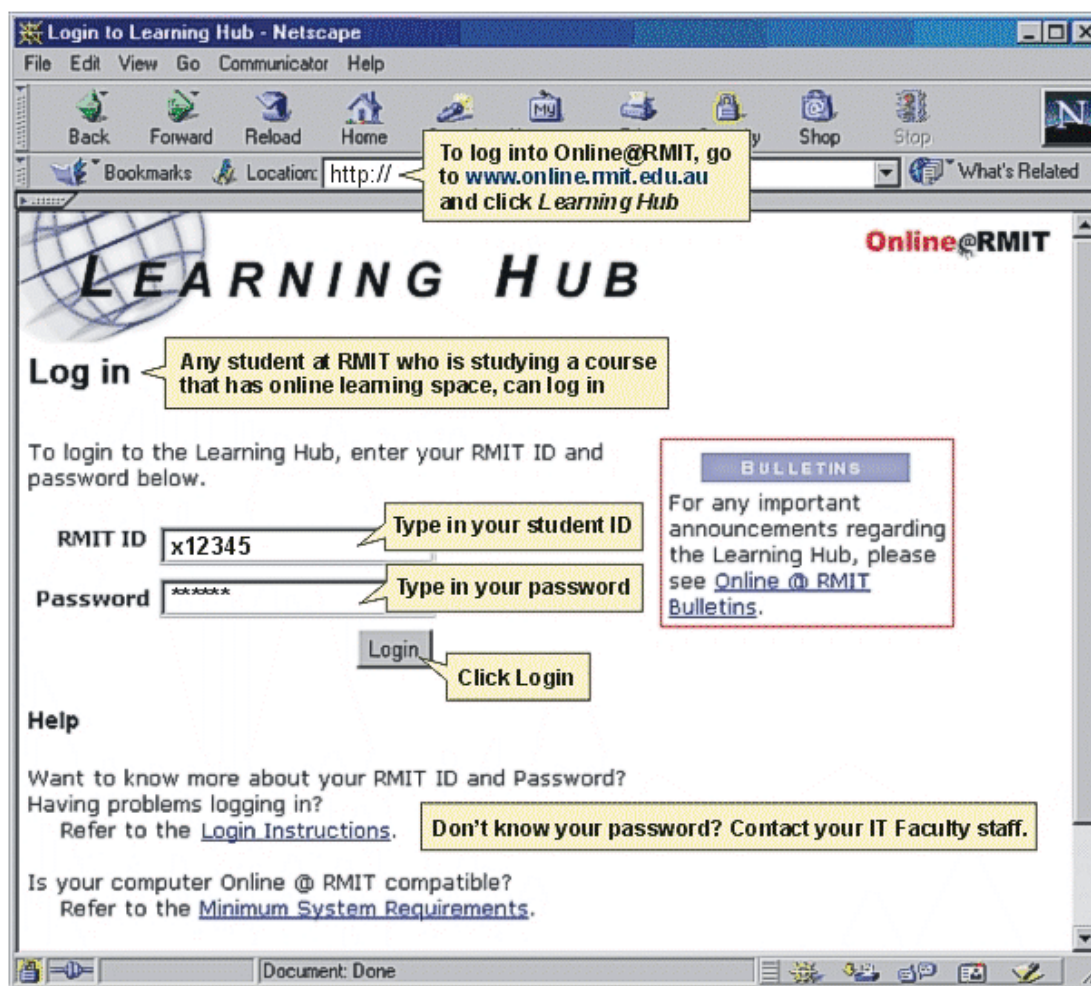


Figure 24: Online @ RMIT iTour High-Fidelity Prototype 1

I informally reviewed the result with three members of the DLS team; the outcome of the review was positive. However, the resulting animated gif at 1.9MB was too large for students to download via their modems—it would have taken too long. After discussion with the graphic designer, we decided that next time the iTour should be developed in Macromedia Flash as this product was known to produce smaller executable files.

At the time the in-house multimedia team did not have a Flash designer so I requested assistance from another RMIT multimedia production group. With this new group I reviewed the size issue with the previous prototype and agreed that the appropriate tool to complete the animation would be a Shockwave file created using Macromedia Flash, as it would produce a smaller 'footprint' and so would be quicker to download. It was also easier to use than Macromedia Director, which had been used in the previous sub-project, the RMIT Orientation.

I provided the multimedia developer with a paper prototype and she prepared a prototype using Flash. The result can be found on the iTour Project web site and a snapshot is shown in the next figure:

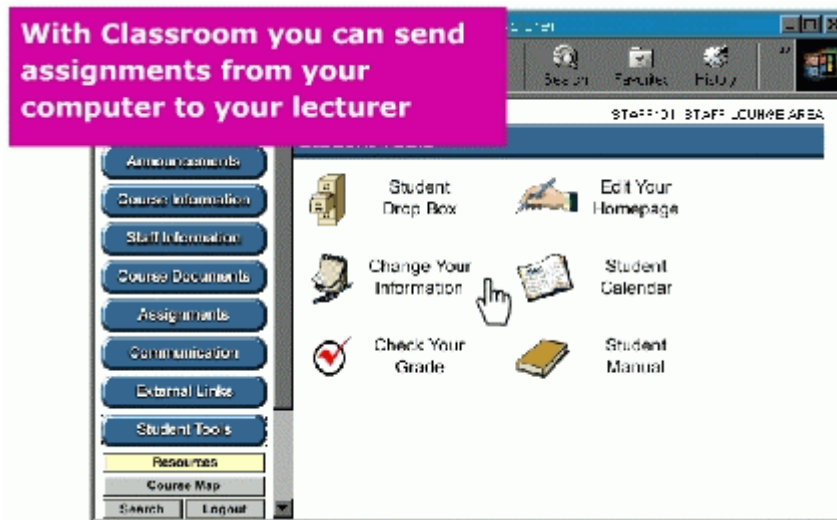


Figure 25: Online @ RMIT iTour Prototype 2

To run the prototype, instructions are as follows:

Instructions	To find the prototype, go to the iTour Project web site then select Sub-project 3 then High-fidelity (animated) prototype 2 .
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At 106KB the prototype proved that the animation could be produced in a small enough size to be downloaded by a modem. However, this was larger than the previously targeted size of 20–30KB. Again I reviewed the size issue with staff in the multimedia team who agreed that this smaller size would be difficult to achieve, and the larger size was still quite manageable when downloading using a modem.

I reviewed the usability of the prototype with the group of colleagues including the DLS Support Coordinator, who was responsible for supporting the staff and students; the DLS Trainer and Technical Writer, who provided the training and documentation; and the DLS Manager. These staff members provided positive feedback informally.

However, I did not like the hot pink text boxes and white letters used in the prototype, preferring the more subtle colouring animations of black text on pale yellow background used in the exemplar online banking animations. Also the initial mouse-click was a single click that sounded like a typewriter key, so I requested that it be changed to a double click.

Until this high-fidelity prototype was completed I had not realised that the design did not include a way to ‘replay’. From the paper prototypes I provided, the designer presumed that the restart button would be on the web page and not in the animation. However, the graphic designer designing the web page in which the animations would be encased thought the restart button should be part of the animation. In the end, the replay button was incorporated in the animation, as the response time was better when it was part of the iTour web page. The iTour was designed so the Replay button displayed at the end of the animation only. This was designed the same as the Westpac banking animation exemplar and seemed to simplify the animation navigation.

With a successful high-fidelity prototype, I then returned to the paper prototypes and completed them. Next I was able to finish the storyboard by writing up or documenting the paper prototypes. I decided to prepare the storyboard in addition to the paper prototype, to assist the developer with deciphering my handwriting. In the end, the developer relied on the paper prototype, only referring to the storyboard when my handwriting was too difficult to read. For an example of the storyboard for the iTour Project web site:

Instructions	To find the iTour Project storyboard, go to the iTour Project web site then select Sub-project 3 followed by Storyboard .
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Early and late model prototypes were reviewed and received positive feedback from members of the Online @ RMIT iTour team, which included the DLS Manager, who was also a lecturer in usability; the DLS Trainer and Technical Writer; the DLS Support Coordinator; and a newly graduated student who had joined the team as the second DLS Technical Writer.

7.2.3 C. Implementing the Design

Cycle 1: A. Planning -> B. Developing -> **C. Implementing** -> D. Observing -> E. Reflecting

In phase three, as the developer created each of the thirteen animations she would send me two or three at a time for checking and feedback in preparation for their release to the students. With the checking I reviewed the interface for errors or ‘bugs’; for example, spelling mistakes, jerky mouse movements, and missing mouse-click sound.

Sometimes the mistake was in the design, in that a concept looked better on paper than in the animated version, so I would rework the section. However, this was not common as the paper prototype provided a good framework from which to design the iTour. Another mistake was when the designer would on occasion put the text box over a strategic part of the screen that should not be covered, so I would instruct her to change this.

Draft iTours are available on the web site:

Instructions	To find the iTour Project version 1 draft, go to the iTour Project web site then select Sub-project 3 then Version 1 draft .
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The Version 1 iTours, of which the next figure is an example, were released to students. This example shows students how to log in.

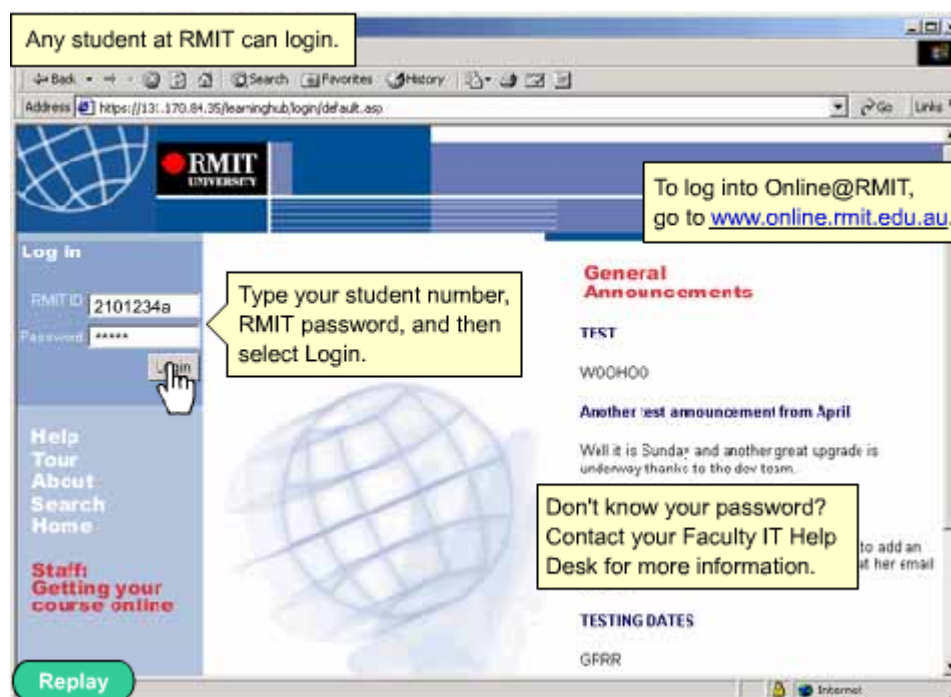


Figure 26: Online @ RMIT iTour Version 1

The Version 1 iTours can be found on the iTour Project web site:

Instructions	To find the Version 1 iTours, go to the iTour Project web site then select Sub-project 3 then Version 1 .
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As the online tours were being developed, a text and graphic version was prepared for sight-impaired students. This meant that the students would have a choice of either viewing the animated iTour or the text and graphics version. For an example, see the iTour Project web site. Flash did not provide a captioning option at this time, or it would have been used instead of the text and graphics version.

Instructions	To find the accessible iTours, go to the iTour Project web site then select Sub-project 3 then Accessible Version .
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Feedback on the designs was requested from members of the DLS team including the DLS Support Coordinator, the DLS Trainer and Technical Writer, and the DLS Manager. They were asked for general feedback on usability and all responded that the usability was good.

The designs were released to the public at the start of the academic year with the usability testing scheduled for later.

7.2.4 D. Observing the Design

Cycle 1: A. Planning -> B. Developing -> C. Implementing -> **D. Observing** -> E. Reflecting

In phases A to C of Cycle 1, the iTours were planned, developed and released to the students. In the fourth phase, formal usability testing was undertaken.

Preliminary usability feedback

I had wanted to proceed with a usability test of the iTours using students at the time the tours were being developed, but this was put on hold until a staff member was hired to manage testing. After this, usability tests of other products were given a higher priority.

Shortly after the release of the iTours, when another product (the Learning Hub) was undergoing usability testing, I asked the test facilitator to solicit feedback from the students on the iTours as well. The last five participants were shown the animations on logging in and using the Learning Hub, and they were asked for their opinions.

The result was that the majority found the pace and content appropriate. They also felt that the animations shown would be helpful to new users. Specifically:

- All users agreed that the login iTour was helpful particularly for first time users, and ran at an acceptable pace;
- Most users felt that the Learning Hub iTour, which introduced people to the Learning Hub, provided an appropriate amount of information;
- One participant said that the Learning Hub iTour ran too quickly; and
- Another user felt that at the end of the Learning Hub animation, the 'speech bubbles' cluttered the scene.

Overall there was a positive endorsement of the iTours, with two negative comments on speed and clutter. However, from the research available (see Rubin 1994; Macguire 1997) I could see that more formal and structured usability testing was required to evaluate the iTours.

Usability Test 1 planning

Eighteen months after the iTours were released, the usability testing was able to proceed. I had wanted to conduct a formal and focused usability test of the iTours for some time, as the

number of students using online learning at RMIT had been growing rapidly. Initially the iTours were available to 21,407 students (Weiss and Kennedy 2000), but by the time the last iTour design was released they were available to more than 40,000 students.

Usability testing conducted on the prototypes was strongly influenced by an approach recommended by Rubin (1994). This approach was adopted as it is well documented and permits testing without the need for a sophisticated usability-testing studio. It involves:

1. Having a purpose for the test and specific questions to be asked;
2. Having a specific documented methodology to follow while testing to ensure consistency;
3. Observing the participant during testing;
4. Asking the participant to follow a think-aloud protocol;
5. Providing the participant with a questionnaire;
6. Asking the participant specific questions during a debriefing session; and
7. Analysing and reporting on the results.

A report on the usability test is located on the iTour Project web site.

Instructions	To find the iTour Project Usability Test #1, go to the iTour Project web site, select Sub-project 3 then Usability Test #1 .
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The testers were ten RMIT student volunteers. They ranged from undergraduate to postgraduate students and were representative of the gender and age groups of the RMIT student population. Approximately half (47%) of the testers were women and the age demographics were 53% <24; 27% 25–29; and 20% 30–34. Almost all participants were experienced computer users and would be considered ‘web literate’ but they were not familiar with Online @ RMIT, the RMIT online learning platform.

Ten testers were chosen as this complied with Nielsen and Landauer’s recommendation that five participants will expose 85% of usability problems in the first round of testing, and at least 15 participants will expose all the problems (Nielsen and Landauer 1993). It also complied with Virzi’s (1990) advice that four to five participants will expose 80 percent of the usability deficiencies of a product.

Five additional volunteers also fitting the student tester profile described above were asked to do the activities without any documentation. This was done to see if the documentation, either animation or the text and graphic version, made a difference.

The purpose of the usability test was to test the effectiveness of the Online @ RMIT iTour. As defined by the Macquarie Dictionary (2005), ‘effective’ means to produce the intended

result, which in this case was usable documentation.

In order to produce quality results, the next step was to formulate the research objectives that would direct the ‘effectiveness’ of the Online @ RMIT iTours testing. After consultation including the DLS Manager, who was also a usability specialist, the following questions were devised:

1. Is this animated form of user documentation usable?
2. How could it be made more usable?
3. Does the participant prefer the animated type of documentation when initially attempting to gain an understanding of the product?

These were answered by first determining what is usable documentation and establishing specific measurable definitions that were not so vague that one could “neither state nor imply how to measure or quantify the results” (Rubin 1994, p.85).

Table 19: Definition of usable documentation

<p>Usable documentation is defined by Horton (1994) as:</p> <ol style="list-style-type: none"> 1. Providing the information the user requires; 2. Communicating effectively so it is readable and understandable; 3. Being time considerate and not running too quickly or too slowly; 4. Ensuring bandwidth issues are transparent; 5. Ensuring users can find the information they require quickly and easily; 6. Containing an appropriate level of interactivity, not too much or too little, so that there is no control; 7. Having consistent structure, navigation, interactivity, and interface; and 8. Being appealing to the users. <p>Schofield and Flute (1997) add:</p> <ol style="list-style-type: none"> 9. Not being frustrating.
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The three questions outlined above would be answered by observation of the testers while using Online @ RMIT, via a questionnaire, and through responses given at a debriefing session:

Table 20: Online @ RMIT iTour usability testing data collection processes

Title	Description
Observations	<p>Observe time required to complete activities and measure the number of errors. Compare results of a control group who were not provided any documentation with two groups who were provided with both types of documentation. The measurements would be:</p> <ul style="list-style-type: none"> ▪ Time required to read/view the documentation initially; ▪ Time required to complete the task; ▪ Number of completed tasks within the agreed times; ▪ Number of times the participant referred to the documentation; ▪ Number of times the participant requested human assistance; ▪ Types and number of errors the participant made; and ▪ Significant behaviour and comments of the participant.
Questionnaire	<p>Ask the participant questions to determine if the documentation was usable. The questions were:</p> <p>7a. Take too long to load? Yes/No</p> <p>7b. Once running, was the animation: Too fast?/Too slow?/The right speed?</p> <p>7c. Were they easy to use? Yes/No/If no, please explain:</p> <p>7d. Did they provide enough information for the task you were given? Yes/No/If no, please explain:</p> <p>7e. Were they easy to understand? Yes/No/If no, please explain:</p> <p>7f. Could you find the information you required? Yes/No/If no, please explain:</p> <p>7g. Did it matter that you couldn't stop the animation because it was so short? Yes/No</p> <p>7h. Were the animations consistent? For example, once you used one, did you know how to use them and what to expect from the others? Yes/No/If no, please explain:</p> <p>7i. With the animations, would you have liked to hear the explanations as well, for example have sound with the animations? Yes/No</p> <p>7j. Once running, were the animations: Too long/Too short/Just the right length?</p>

Other factors were incorporated that did not require usability testing, because they were important determinants of effectiveness from an organisational perspective. These factors are documented in the next table:

Table 21: Institutional effectiveness concerns

Institutional concerns	<ol style="list-style-type: none"> 1. Was the content able to be used by people with disabilities (see Australian Disability Discrimination Act 1992)? 2. Was it effective for the organisation by fitting the timeframe and budget allowed (see Schofield & Flute 1997)? 3. Was the interactive updateable (ibid.)?
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Usability Test 1 preparation

After the objectives were identified, the test was prepared following Rubin's (1994) methodology of identifying and documenting the following:

- Purpose;
- Profile and number of users;
- Test objectives;
- Method or test design;
- Task list;
- Data to be collected;
- Report;
- Test team;
- Location; and
- Equipment.

In order to test the usability of the tours, four tasks were devised based on activities animated in four tours (one task per tour) including:

1. Sending an assignment;
2. Reading a grade;
3. Reading a message; and
4. Sending a message.

I chose four tasks as this would enable the test to be contained within a 20-minute timeframe, enabling the whole test including introduction, questionnaire and debriefing to be completed within one hour. Common sense suggested that this was long enough to ask the students to attend the test. Also, four questions linked to four activities would capture a range of usability problems.

In the test the students performed four activities with the software, each supported by one of the four iTours selected previously or the text and graphic documentation. Students were instructed to use both iTours and documentation, so that I could compare the effectiveness of the iTours.

A staff member greeted each student on arrival for the test. Following the orientation, the staff member explained the test, emphasising that the student could leave at any time. My role and bias was explained and it was stressed that the product was being tested, not the student.

Conducting the usability testing for test 1

For each task, students were asked to view an iTour or use text-based documentation on how to perform the task, and were then requested to do a set task that had been described by the iTour such as join in a discussion list. With the four activities students used iTours for two of them and documentation for two; iTours and documentation were alternated for each student. The results recorded for each student included: success rate; completion time; number of times they needed to check the iTour or other documentation for further information; number

of times they asked for help from one of the staff managing the test; the steps followed by each participant; and their comments.

Two other test facilitators and I recorded the sessions and compared results after each test. The tests were extensively noted by hand because, for ethical considerations, no video taping of participants was permitted.

A ‘think-aloud’ protocol was used to encourage participants to talk about what they were doing and thinking during the test. The approach adopted was similar to that recommended by Boren and Ramey (2000) in which the observer can give ‘*mm-hmm*’ tokens as feedback, can repeat single word triggers for clarification, and can encourage the user when ‘stuck’. It differed from Boren and Ramey’s approach in that more than a single word was sometimes used for feedback, so participants did not feel as though they were being psychoanalysed.

After the students completed the hands-on part of the test, they were asked to complete the questionnaire. This was followed by a debrief where the student and the testers would freely discuss the interface.

Usability Test 1 results

The students provided the positive results listed in the table below:

Table 22: Online @ RMIT iTour Usability Test 1 positive results

Activity	% of the 10 students who agreed
Load time was appropriate.	100%
The speed was neither too fast nor too slow.	60%
The iTour was easy to use.	90%
There was enough information to do the task.	90%
The iTour was easy to understand.	90%
The tester could find the required information.	90%
The iTours were consistent.	90%
The iTour length was appropriate.	80%

The students also requested change:

Table 23: Online @ RMIT iTour Usability Test 1 change requests

Requirement	% of the 10 students requesting	Further information
More control	100%	This included the ability to stop or pause; restart or start; step or move through, for example with a slider bar; and control the speed, for example with a slider bar.
Progress bar	40%	This included some way of determining the progress through the animation—to see how much time was left.
Visibility	30%	Requested larger text, of which 20% also requested more prominent buttons and 10% wanted to see a clearer background.
Feedback	20%	Requested stronger audio and visual indication; for example, when the iTour starts or finishes.
Instructions	20%	Requested instructions on how to run the iTour.

Of the 10 student testers, 40% preferred the animations, compared to 60% who preferred the text and graphic documentation. Of the 60%, however, four of the six stated that they would have preferred the animations if they were provided with more control.

Specifically, students wanted to move at their own pace through the animations. They wanted to be able to stop, start, restart, step through it, go back, exit at any time, and control the speed. As a result of the feedback it was concluded that a navigation redesign was required.

This information was documented within two days of the test and a short report as recommended by Rubin (1994), with many quotes from the students, was prepared and reviewed with the development team. For an example, see the iTour Project web site.

Instructions	To find the short report resulting from the usability testing, go to the iTour Project web site and select Sub-project 3 , then Usability Test #1 , then Data Analysis 1 . The report should be visible in yellow; if not, simply scroll down to it.
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I did also pursue more extensive analysis to determine if the iTours were more effective than the text and graphic documentation. The results are as follows:

Table 24: Online @ RMIT iTour Usability Test 1 analysis

Analysis	Outcome
Time to read or view documentation ONLY	It either took as long on average to view the animation as it did to read the text, or longer. Overall it took 62% more time to view the animation. Note: Most participants did not read documentation from start to finish; however, they did view the animation completely (4.99 minutes average viewing iTours; 3.08 minutes with documentation).
Time to complete each task not including reading or viewing the animations	Adding the average times of both groups for tasks, the time for those who used the iTour was 10% less (2.83 minutes using the iTours versus 3.16 minutes with documentation).
Percentage of testers performing successfully, regardless of the time benchmark, including those who require assistance	Only 60% of the control group (those who did not have access to any documentation), or three of the five participants were able to complete task I, whereas 100% of the other groups were able to complete the activity. 1 of the 10 testers who used the iTours did not complete an activity within the maximum time where as all using text-based documentation did.
Percentage of testers performing successfully, within the time benchmark, including those who require assistance	When the time required to complete the tasks was taken into consideration, the control group success rate reduced from 60% to 40%. Also, the iTour users' success rate dropped. The first participant using animation for this test spent longer than the others orientating himself with the activity, working out how the animation worked, and moving back and forth between the animation and the software. That person required less than 6 minutes but over 5 minutes, which was the maximum time allowed.
Task accuracy and error rate summary	Errors made are the same whether using animation or text-based documentation (1.2 errors per person or 6 errors per group). On average, the control group or the group of five who had no iTour or documentation at all, made 6.5 errors per person or 30 errors per group.
Amount of assistance from the documentation required by users	The number of times the users referred to the documentation for assistance was much higher with text (18 occurrences) versus with iTour animations (4 occurrences). Users using text-based documentation needed to refer to the documentation 450% more than those with animation.
Requests for human assistance	Testers using the iTours asked for help one more time than those using text during the time when they were viewing the animation. The control group asked for help 333% more than either of the other two groups.

Quantitative data showed that it took both groups with access to documentation, regardless of whether using documentation or animation, about the same time to do each task, and they made the same number of errors. However, users with access to any type of documentation were significantly faster and made fewer errors than those without any documentation.

The sample on which this statistical analysis was performed was small and would not be a statistically relevant indication of trend. However, the iTour usability results compare with

Harrison's (1995) study suggesting that using any online help, either still graphic or animated, enabled the users "to perform more tasks in less time and with fewer errors" (ibid.) than those users who did not have visual instruction.

Harrison's (1995) paper showed no significant difference between the performance of subjects in the still graphic conditions and the animated conditions. She did not, however, track the number of times users referred back to their documentation, so I cannot compare the significant improvement of the iTour over online documentation in this area (18 times with text-based documentation versus 4 times when using iTours).

For further information on the similarity of results between the iTour users, versus the text-based documentation users, see Reflections on the small differences between usability testing for iTours and text-based documentation, on page 112.

The qualitative data, whether comments from the students provided from the think-aloud protocol, the questionnaire or through the debriefing session, provided the best feedback on the navigational issues. Content analysis was performed on the students' answers. Comments from students were recorded and colour coded into pink for positive, green for negative, and blue for suggestions, then categorised further by issue. For example, if three users commented that a slider bar should be added, these comments were grouped together under the heading "Slider bar". The number and types of comments indicated the importance of the issue.

For further information on the content analysis see:

Instructions	To find the out more about content analysis used with the usability testing, go to the iTour Project web site and select Sub-project 3 , then Usability Test #1, Data Analysis 1 then Content Analysis .
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Having collected the data from the research, I moved to a period of deeper reflection on the design.

7.2.5 E. Reflecting on the Design

Cycle 1: A. Planning -> B. Developing -> C. Implementing-> D. Observing -> **E. Reflecting**

At this point, I now had access to Flash developers within the DLS who could work on the iTours. So, I reviewed the iTour Usability Test 1 findings collaboratively with a review panel to consider how to implement the changes.

The review panel included myself; the DLS Trainer and Technical Writer; the DLS Technical Writer who was a recent student; the DLS Tester; and two new media (Flash) designers from the design team.

The resulting recommended changes are documented in the following table:

Table 25: Online @ RMIT iTour changes resulting from Usability Test 1

Requirement	Response
More control	Provide a slider bar, and 'next' or 'previous' selections.
Progress bar	Provide a slider bar.
Visibility	<p>Make the text in the text bubbles more legible by changing the font, colour of the text, or background colour.</p> <p>Make buttons more obvious so they do not appear to be part of the software product being demonstrated. Three ways to do this were discussed:</p> <ul style="list-style-type: none"> ▪ Move the buttons so they were outside or below the software product window; ▪ Increase their size; ▪ Provide rollover description over the buttons.
Feedback	Provide a stronger indication of when the animation has ended.
Instructions	Change the instructions associated with each animation to say something about the specified task, and not provide the same information for each animation.

The testing endorsed that the following features were usable, so it was decided not to change them:

1. Speed;
2. Length; and
3. Content in the text boxes.

The review panel considered the following suggestions but decided not to implement. The reasons are documented with each item:

1. Continual looping. This approach can be confusing because the user may not know that the animation has ended;
2. Increase the size of the screen capture. This was rejected due to the amount of work required to redevelop existing screens at a larger size. Also it was felt that what the tester was really asking for was larger text on the text bubbles, as the other usability testers had;
3. Split Screen. Due to the amount of work to implement, it was decided instead to provide students with more control and see if future usability testers requested this feature; and
4. Use of speech. Although 40% of testers recommended that a voice-over be added, it was decided not to implement as it would add an extra level of complication, and require extra time and resources that were not available to the development team at the time.

Usability Test 1 conclusion

All the qualitative and quantitative results were combined to answer the original questions posed, summarised simply as follows:

Table 26: Online @ RMIT iTour usability testing answers

Question	Answer
Is this animated form of user documentation usable?	<p>For this test, the iTour form of user documentation is partially usable in that it is consistent, well written and does not take too long to run. However, there is frustration with lack of control; some users wanted sound although they were in the minority, and others recommended improving the accompanying documentation. People using the iTours referred back to it far less than those using text and graphic-based documentation, and certainly less than those using no documentation. The error rate was the same when using text-based documentation or when using the iTours for documentation.</p> <p>This animated form of user documentation is usable, but the lack of control and poor supporting documentation make it frustrating to use and so these issues should be fixed as soon as possible.</p>
How could it be made more usable?	It could be made more usable by improving level of control, visibility, feedback, supporting documentation and providing a progress bar.
Does the participant prefer the animated type of documentation when initially attempting to gain an understanding of the product?	40% of the students preferred the animations to the text and graphics tours; 60% preferred text-based documentation; however, 4 of the 6 stated that if the animations provided them with more control they would have preferred them. Therefore the result of this question was not positive, but could be if more control were added.

Regarding the institutional concerns:

Table 27: Online @ RMIT iTour institutional usability concerns

Question	Answer
Was the content able to be used by people with disabilities (Australian Disability Discrimination Act, 1992)?	<p>I decided that the combination of providing an animated iTour with the text and graphics-based documentation would be suitable for this. All the graphics were checked to ensure they had alt-tags so could be identified by text readers for those visually impaired students.</p> <p>It was understood that providing separate documentation was not as ideal as having one set of instructions for all, as this can marginalise or, in particular, make the visually impaired students feel marginalised.</p>
Was it effective for the organisation by fitting the timeframe and budget allowed (Schofield & Flute, 1997)?	The product took two weeks to design initially, followed by three days working on prototypes and two days of development work for the first version of the animations. It fitted the timeframe and the final product was under budget.
Was the interactive updateable (Schofield & Flute, 1997)?	Staff in the Production Team, associated with the Development and Test Team, had Flash and were able to support the development of the animations.

7.2.6 Usability Test 1 reflections

Reflections on phase 1 testing of this sub-project were:

- I knew but confirmed that it is important to observe the usability testers first-hand, in order to understand better how people use the iTours and to be able to question the testers more deeply;
- I decided to simplify the usability testing process analysis. The reason for this was that the more detailed analysis was similar to that recommended by Rubin (1994), but became more complex as I explored the differences between users with and without documentation, and those using the different types of animation.
- The results, although interesting, were not statistically relevant and would require further studies to prove the outcome. At the same time, the differences between using the text-based documentation and iTours were very small. So the in-depth statistical analysis was removed, simplifying the reporting process. This was in keeping with a different approach by Krug (2000), who recommends reviewing the results straight away and working out what can be fixed immediately; and
- The usability testing showed that parts of the design were usable; however, not providing the users with control was a serious problem in the design. When asked their preferences, 40% preferred the animations but an additional 40% said they would have preferred it if they were provided with more control. Institutional factors (see Table 27 on page 108) were positive and could be met.

7.2.7 Reflections on the definition of usable documentation

Usable within this sub-project and Exegesis, means documentation that:

1. Provides the information the user requires;
2. Communicates effectively; is readable and understandable;
3. Is time considerate and not running too quickly or too slowly;
4. Ensures bandwidth issues are transparent;
5. Ensures users can find the information they require quickly and easily;
6. Contains an appropriate level of interactivity, not too much or too little, so that there is no control;
7. Has consistent structure, navigation, interactivity, and interface;
8. Is appealing to the users.

(Horton 1994)

and

9. Is not frustrating (Schofield and Flute 1997).

A more contemporary definition of usability emerged while the research was underway (Dix, Finlay, Abowd, and Beale 2004; Hollis-Weber 2004; Benyon, Turner and Turner 2005; Lauesen 2005). Usability is “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” (Hollis-Weber 2004, p.157). Usability includes the following elements:

- Easy to learn—people can use it the first time they encounter it;
- Easy to remember—people can use;
- Effective—people can easily navigate through, understand, and use it to solve problems;
- Efficient—people can find what they need, accomplishing their goals within a reasonable amount of time; and
- Satisfying—people feel good about using it, know it was worth their time and expect to use it again.

(Dix et al. 2004; Hollis-Weber 2004; Benyon et al. 2005; Lauesen 2005)

I selected the first definition of usable defined in Table 19: Definition of usable documentation, on page 100 as it was very specific, developed by technical communicators focusing on documentation and multimedia design. It included points that could be applied to iTours and readily tested via usability testing. I applied this definition all through this research to maintain consistency in the testing and to enable the results to be compared and contrasted. If I had changed the definition of usability against which I was testing, part way through, the results would have been difficult to compare with previous results.

The next table illustrates that there is a relationship between the two definitions:

Table 28: Comparison of ‘usable’ definitions

Definition of usable	Easy to learn	Easy to remember	Effective	Efficient	Satisfying
Provides the information the user requires;		✓	✓		✓
Communicates effectively; is readable and understandable;	✓	✓	✓		✓
Is time considerate and not running too quickly or too slowly;			✓	✓	✓
Ensures bandwidth issues are transparent;				✓	✓
Ensures users can find the information they require quickly and easily;	✓	✓	✓	✓	✓
Contains an appropriate level of interactivity, not too much or too little, so that there is no control;	✓	✓	✓	✓	✓
Has consistent structure, navigation, interactivity, and interface;	✓	✓	✓	✓	✓
Is appealing to the users.	✓	✓	✓		✓
Is not frustrating.	✓	✓	✓	✓	✓

Source: Adapted from Horton (1994), Schofield and Flute (1997), Dix et al. (2004), Hollis-Weber (2004), Benyon et al. (2005), and Lauesen (2005)

7.2.8 Reflections on audience in Sub-project 3

In Further reflections on the concept of audience, on page 70, I explored the concept of audience and its use within this iTour Project. I documented on page 74, that in Sub-project 1 I managed the concept of audience using a classification approach and by fictionalising the audience. In Sub-project 2 the analysis became more sophisticated, and the creation of an imaginary audience was as close to the real audience as I could make it by discussing the project with audience members.

In Sub-project 3, the approach to audience was again similar to Coney and Steehouder’s (2000). I established a design and development team that included members of the audience. This time, however, the design cycle included sessions where I sat down directly with students so I could observe them using the design, and solicit their feedback. Importantly, over Sub-project 3, audience feedback resulted in three major sets of design changes and again, for me, a much deeper understanding of the audience and their requirements than with the previous two sub-projects.

7.2.9 Reflections on the small differences between usability testing for iTours and text-based documentation

The outcome of the usability testing contained some close results between those students using text-based documentation and those using the iTours. This section reflects on those results and whether or not it is a mistake to develop iTours, or whether it would have made more sense to create well-illustrated PDFs.

It should be noted that the sample size of ten students who participated in the usability test was small. As indicated earlier, this test was used to expose problems rather than draw inferences about the student population (see Virzi 1990; Nielsen and Landauer 1993). However, other studies (see Plaisant and Shneiderman 2005) also conducted on small populations or with similar results, suggest that it is worth reflecting and noting some of the similarities and differences between the text-based documentation and iTours exposed by the usability testing.

Key results of the usability testing are summarised as follows:

1. Where animations and text-based documentation were equivalent:
 - 100% of the students tested with iTour style documentation completed the activities, which was the same result as the text-based documentation; whereas only 60% of the control group of five, who did not have access to any type of documentation, completed; and
 - The number of errors made was the same whether using animation or text-based documentation (1.2 errors per person or 6 errors per group). This is contrasted with 6.5 errors per person when no access to documentation or iTours was provided.
2. In favour of the animations:
 - It took 10% less time for those who viewed the iTours to complete the tasks (2.83 minutes using the iTours versus 3.16 minutes with text-based documentation); and
 - The number of times the users referred to the documentation for assistance was 450% more with text (18 occurrences) versus with iTour animations (4 occurrences).
3. However, less in favour of the animations:
 - It took longer for users to look at the animations; for example, 4.99 minutes versus 3.08 minutes for the text-based documentation. Testers observed

- would view the whole animation, often replaying it; whereas they would only read a portion of the text-based documentation, then leave it to do the task;
- One of the ten testers did not complete one of the four activities within the maximum time when using an iTour for documentation (he required less than the 6 minutes but over the 5 minute maximum); whereas all using text-based documentation did complete on time. It was observed that the one tester took longer to orient himself with the iTour; and
 - Testers using the iTours asked for help one more time than those using text. However, the control group asked for help 333% more than either of the other two groups.

Although it took longer for users to look at the animations, as they would often replay them, the animation appears to be at least as effective as the text-based documentation. It took less time for those using the iTours to complete the tasks, but this could have been a direct result of the longer time they spent looking at the animation than the text-based documentation. If the finding of the significant reduction in the number of times the participant referred to the documentation could be repeated, then this is a significant endorsement of the animations.

During the literature search I also noted a growing rate of adoption of iTour style documentation. As described earlier in this Exegesis, a web search revealed that products are available to develop online animated interactive tours such as Qarbon ViewletBuilder, TechSmith Corporation Camtasia and Macromedia Captivate, or pre-built tours are available from PC Show And Tell. There are also many companies designing and using tours such as Blackboard, WebCT, Macromedia, Cisco, Westpac Bank, National Australia Bank, Microsoft, Adobe, and Questionmark.

At RMIT University the iTour take-up was positive with the following result recorded in 2003. iTours were used on average by 747 students per month, with a maximum of 1224 during peak times. Visits were on average 642 more per month or 7.5 times higher than for the text-based documentation. The link to the iTours has now been moved deeper into the web site, but a check of the statistics for usage for one iTour on logging in to the RMIT online learning system shows that for March 2005, there were 399 visits or more than six times the number of visits than for the corresponding text and graphics page, which received 65 visits. This shows that the popularity of the iTour format in relation to the text and graphic format continues to remain high.

Also statements from the usability testers themselves were very supportive as included in the PhD Project within the Data Analysis 1 in Sub-project 3:

Animation is less confusing than text “shows exactly where to go”; shorter and sharper;

“I say stick with animation”;

“Animation good and clear”;

“I preferred the text because I used it at my own pace. If I had triggered the animation, I would have preferred the animation for its efficiency of imagery.”;

I concur with Plaisant and Shneiderman (2005) who refer to five sets of other researchers' work which demonstrate either unsatisfactory or close to the same results when testing and using recorded demonstrations, either in conjunction with text-based documentation, or on their own. My research found similar results. Plaisant and Shneiderman do conclude, however, that their experience with their own recorded demonstrations called 'Show Me!'s' had been positive and they are observing a growing rate of adoption.

Recently, a more positive paper has emerged in support of animations and animated guidelines. Hsieh, Chen and Lu (2005) studied computer-aided interactive tutoring components. The evaluation results from the students in that study were that students favoured using the components that are relatively easy to use and have less complexity such as a guided example, interactive animation example, and integrated multimedia presentation.

With growing positive results and rate of usage of this style of documentation worldwide, I believe that it is not a mistake to use iTours instead of a more traditional style of documentation. As for whether it would have made more sense to create well-illustrated PDFs, these are similar to the text-based documentation supplied with Online @ RMIT. However, in Sub-project 3, text-based documentation was used six times less than in the iTours, which shows that in this case it would not have made more sense.

7.2.10 Reflections on the quality of the user experience

An important factor in the success of an iTour is the quality of the user experience. This section reflects on iTours in the context of contemporary ideas about engagement and enjoyment.

Monk (2002) proposes that the current view of usability is too restricted as it is focused on the office, where ease of learning and use as well as task fit are the priorities. However, there are valuable lessons to be learned from usability of products developed for use in the home, where engagement and enjoyment are a priority.

Even though enjoyment has recently been applied to the user experience (Jefsioutine and Knight 2003), I have pondered the issue of engagement and enjoyment in relation to the

iTours. This issue has been particularly evident when observing friends and family engagement with the Xbox™ and other computer games, or when viewing other animated objects such as watching the feature length animation *The Incredibles™* or shorter animations such as *Invader Zim®*.

I have also considered this in relation to pleasure and enjoyment from simply completing a task, for example. Jordan (2003) draws on Tiger's (1992) framework of pleasure and relates "psycho-pleasure" to the enjoyment one has when using a word processor that works without error, versus using a word processor that is problematic and not error free; the level of pleasure for the user would be greater with the former. Similarly, iTours demonstrate how to use the software and so assist a person complete a task, therefore making the task more enjoyable and engaging than if the user could not complete it and became frustrated.

We may ask how enjoyable the iTour should be and if 'enjoyment' should be extended to 'fun' or whether it is sufficient that the iTour is simply efficient and reliable, providing information as required in a manner that is clear; integrated; structured; concise; consistent; helpful; error free; controllable; accessible; approachable; updateable; and searchable—as reflected in the guiding themes for iTour design within this research (see Table 41: Twelve overarching guiding themes for iTour design, on page 173).

One issue involved in determining the quality of the user experience is measuring engagement and enjoyment. Some current research in this area is described next.

Monk (2002) recommends dividing enjoyment into components that are measurable, or at least that are sufficiently specific to know when they are present or missing. He identifies components of enjoyment as a high level of engagement by a person with a product, aesthetic attraction and narrative completeness that comes from an engagement with conversation.

Yi and Hwang (2003) emphasise enjoyment as an important motivational factor for accepting a new technology. Their tests revealed the importance of enjoyment as well as self-efficacy and learning goal orientation, in the acceptance of a new technology that was the Blackboard e-learning system. Through their tests they found enjoyment to have a positive effect on ease of use and a significant effect on usefulness. They even found that in the presence of enjoyment, "ease of use no longer had a significant effect on usefulness" (p.444).

Hu, Janse and Kong (2005) found that increased control, by permitting the users to move from passive watching to active control (such as being able to move around the product space), increased the user's level of enjoyment.

With regard to the iTours there has certainly been a high level of take-up, initially from 700 to 1200 a month and always at least six times that of the text-based documentation used in

parallel. This indicates that people may be finding the iTour useful. The statistics also show that people look at clusters of iTours. For example, they tend to look at all the Blackboard iTours. There would be many factors for the high level of take-up and engagement demonstrated, but enjoyment as observed by Yi and Hwang (2003) could be one.

With the iTours we learned from the results of the usability testing within Sub-project 3 that limited navigation control made the testers frustrated and unhappy, consistent with Hu, Janse and Kong's (2005) findings.

I observed a high level of engagement during usability testing but this would be due, in part, to the environment created for the usability test and the fact that the students were being timed. Further research is required to better determine the level of engagement.

My goal with this current iTour research was to ensure that there was a basic set of guidelines that would encourage a positive user experience. One of the ways in which I have encouraged a positive user experience is by documenting points that will contribute to this, ensuring that they were integrated with the 11 design principles (see Table 42: iTour design principles, on page 174) and that they were tested directly when conducting usability testing. Table 19: Definition of usable documentation, on page 100, documents the positive user experience features I identified during my research.

In the User experience guidelines on page 175, two points verge on achieving engagement and enjoyment. These two points are: 8) being appealing to the users (Horton 1994); and 9) not being frustrating (Schofield and Flute 1997). In future, my testing and research will extend to measuring enjoyment and engagement.

7.3 Cycle 2: Online @ RMIT iTours (Version 2)

The planning phase of this second cycle has an element of Fuller's Design Science Planning process, in which one defines the problem and the preferred state, designs the preferred system, then develops the implementation strategy (Fuller 1992). In Fuller's model one also defines the present state, but this had been defined in the previous cycle of my research so was not repeated.

The next diagram illustrates cycle two in which Version 2 of the iTours was created:

Cycle 2: Online @ RMIT iTours Version 1

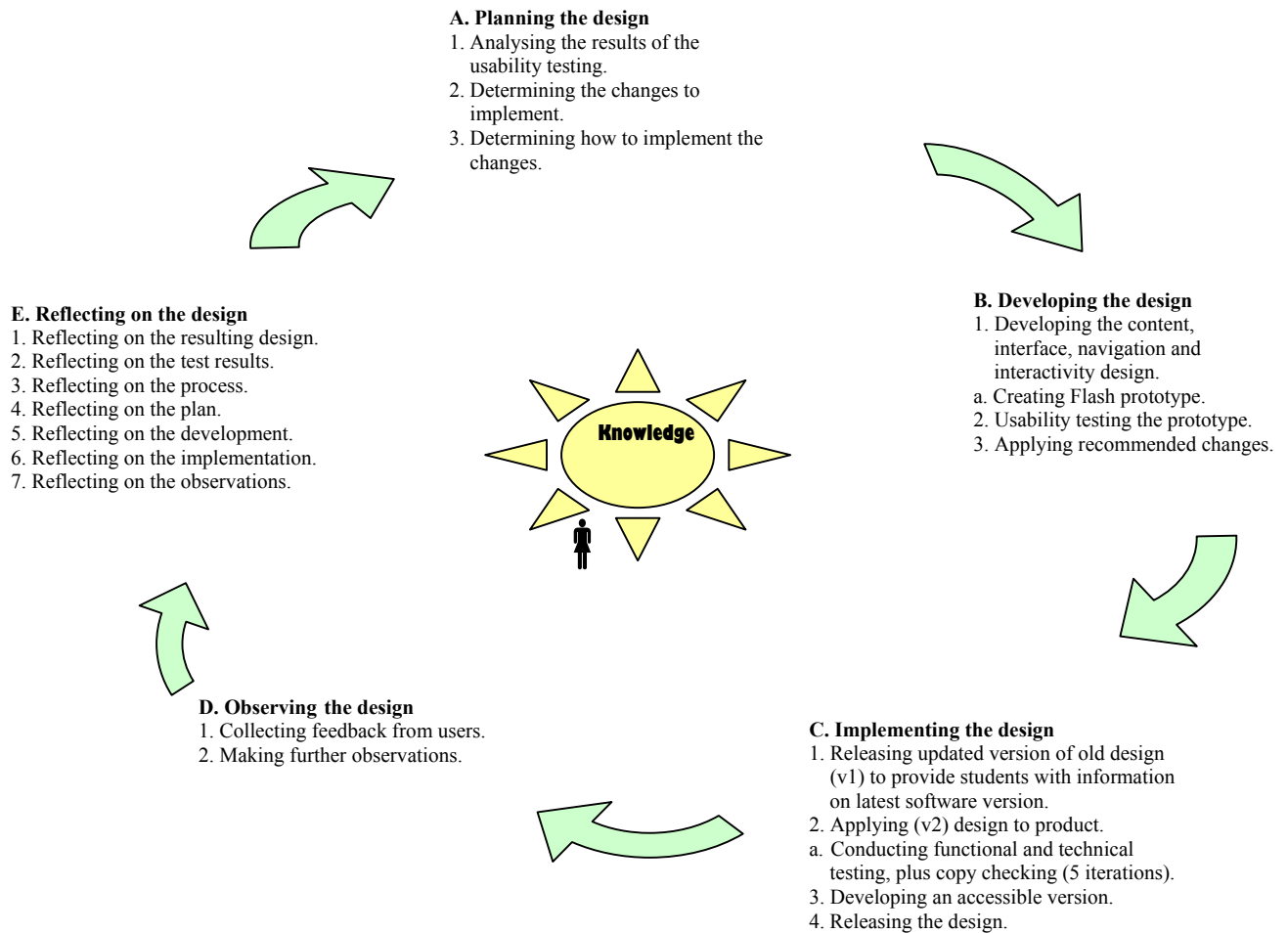


Figure 27: Online @ RMIT iTour Version 2 PDIOR design cycle

7.3.1 A. Planning the Design

Cycle 2: **A. Planning** -> B. Developing -> C. Implementing -> D. Observing -> E. Reflecting

In phase one, a panel met to review the results of the usability testing and to consider how to implement the changes requested by the student testers. In this phase the changes were discussed further with the result that the changes in Table 29 were agreed upon and commissioned with the design team.

7.3.2 B. Developing the Design

Cycle 2: A. Planning -> **B. Developing** -> C. Implementing -> D. Observing -> E. Reflecting

The changes made to the iTours are documented in the next table.

Table 29: Online @ RMIT iTour improvements after Version 1

Requirement	Response
1. Control	
Ability to stop;	A stop button has been provided.
Ability to step through it, using any of the following:	
* Next and previous buttons	Provided next and previous buttons. They move the animation to the next or previous major section.
* Slider bar	Provided. Can see animation change when slider icon is moved.
* Go back (Back button)	Provided with slider bar or previous button.
* Control speed, for example with slider bar	Provided with slider bar.
Ability to restart or start;	Animation now does not start until started by person viewing.
Ability to pause and continue;	Provided pause via a stop button; can continue via play button.
2. Progress Bar—to show how long left	Yes, provided in the slider bar.
3. Visibility	
Change colour of speech bubbles so they do not look like alt-tags;	Have used green. Will also show testers orange.
Increase size of buttons or improve legibility;	Buttons have been added to a panel, and a slightly different colour from the screen is used.
Add rollovers to differentiate other objects on screen;	Buttons now have rollovers.
Need to make buttons stand out, for example move to below animation;	Yes, buttons are now grouped together on a visually prominent panel and so stand out more.
Add more buttons or controls—see point 1 in this table to improve ability to control;	Yes, more buttons have been added.
Make text stand out either by increasing size of text in speech bubble or by improving legibility;	Yes, colour of speech bubble has been changed; this makes the text easier to read so the size of text has not been changed.
4. Feedback	
When it ends;	Animation greys out when it ends.
When it starts;	Animation is greyed out until it starts.
All the time, make animation stand out on page;	The slider bar running across the lower edge of the animation makes it stand out.
5. Instructions	
Change the instructions associated with each animation to say something about the specified task, and not provide the same information for each animation.	Instructions modified.

The designers produced a visual response in a series of prototypes, to match the changes requested as documented in the previous table, which are available for viewing in the iTour Project web site.

Instructions	To find the prototypes, go to the iTour Project web site then select Sub-project 3 followed by Version Two Prototype .
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An image of the control panel is shown next. The Replay button was replaced with a permanently available navigational control panel (shown in Figure 28). The viewer is prompted to 'Press play to start' then this message disappears while the animation is running.

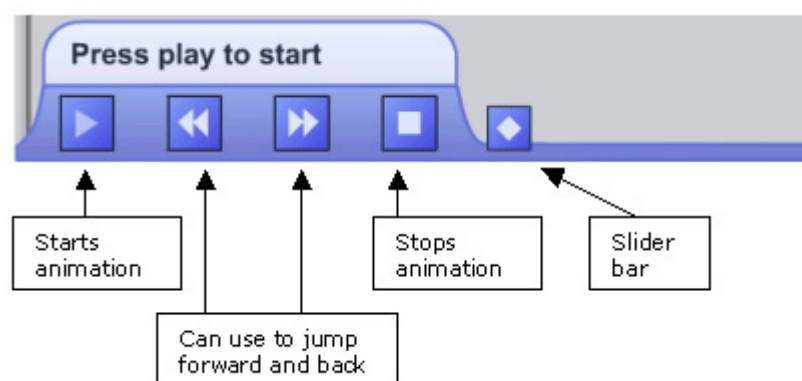


Figure 28: Online @ RMIT Version 2 iTour animation control panel

As iTours were being redeveloped, I modified the orientation text to introduce the screen and describe how to run the iTour.

7.3.3 C. Implementing, Observing and Reflecting on the Design

Cycle 2: A. Planning -> B. Developing -> **C. Implementing** -> D. Observing -> E. Reflecting

The four modified iTours were tested on a new group of student volunteers. This time I tested eight students, an acceptable number (see Nielsen and Landauer 1993). The usability test was run in the same way as the previous one, but the resulting reports were based purely on the thematic analysis and simple statistics based on the short answer questions. Students were also shown prototypes with both green and orange text boxes to see which they preferred.

The analysis was simplified to include the results of the questionnaire, comments of students, and the quick report. This meant that the results were ready in two days versus four weeks of the previous testing. This time, I was more influenced by Krug's (2000) web usability methodology, which recommends a simpler report in line with the short report that I had originally produced with the testing.

The positive outcome of the usability test 2 is shown in the table below compared with the results of test 1:

Table 30: Online @ RMIT iTour Usability Test 2 positive results



Outcome	Result	Improvement
Load time continued to be appropriate	100% for both tests.	Same
The perception of speed had improved.	60% in the first test said that the speed was neither too fast nor too slow; in the second test the percentage improved to 87.5%. Perhaps this was a result of the added controls.	Improvement
Found it easy to use	All but one tester in each test; 90% in the first and 88% in the second.	Same
Found there was enough information to do the task	90% in the first test and 100% in the second.	Improvement
Found it easy to understand	All but one tester in each test; 90% in the first and 88% in the second.	Same
Could find required information	90% in the first test and 100% in the second.	Improvement
Thought the iTours were consistent	90% in the first test and 100% in the second.	Improvement
Found the iTour length was appropriate	80% in the first test and 88% in the second (two users in the first versus one user in the second).	Improvement
Preferred the animations	40% in the first test and 50% in the second.	Improvement

Students of test 2 also provided the following results, requesting further change:

Table 31: Online @ RMIT iTour Usability Test 2 change requests

Request	Level of Support	Improvement
More control	100% in the first test and 0% in the second; however, students found the stop button confusing.	Change required
Include voice-overs	40% in the first test and 50% in the second.	Change required
See progress	40% in the first test requested a slider bar; 30% in the second wanted the new slider bar to look more like the ones they were used to seeing e.g. in QuickTime.	Change required
Visibility e.g. larger text	30% in the first test and 0% in the second.	Improvement
Feedback—stronger audio and visual indication such as when the iTour starts or finishes	20% in the first test and 0% in the second.	Improvement
Instructions	20% in the first test and 0% in the second.	Improvement
Orange or green text box preference	Seven to one preferred green, although one of the seven would have preferred blue more.	Change required

Judging by the above results, the iTour had definitely improved; however, changes were still required. My journal notes were as follows:

- Students preferred the green text box rather than the orange one;
- Students found the pause  button confusing as they thought it would return the viewer to the beginning. Suggest replacing it with a button with two parallel lines:  as used in popular media object players;
- Students suggested that the slider bar should look like a slider bar. Need to have it sliding along something. Even though there is a line at the bottom of the screen, they felt it was decorative and representative of a slider bar. Current bar:



- One student pointed out a discrepancy between the tours and the software product, as the product had changed since the tours were released. Recommendation was to update the iTours as soon as possible;
- Although voice-overs were requested by 50% of the students, there was insufficient time and resources to provide.

Further research in accessibility (COMLAW 1992; W3C 1999; CITA 2002; HREOC 2002) resulted in advising the graphic designer that:

- Navigation should be achieved with a keyboard because testing found that the slider bar could not be controlled in this way; and
- The keystrokes should be documented.

The above changes were then made to the iTours resulting in a modified control panel, green text boxes, and modified orientation text.

In the final release of Version 2, the design of the control panel was changed to include:

1. A new stop and start button using the same icons as in popular players (see next figure);
2. A slider bar that students recognise as a slider bar; and
3. A progress indicator to show viewers how far through the iTour they have progressed and how much further there is to go. For example, in Figure 33, 1/10 means that the viewer is looking at frame 1 of 10. The slider bar indicates (and can control) the progress of the iTour.



Figure 29: Online @ RMIT Version 3 iTour animation start button

The start button in Figure 29 is not shown in the control panel below as it represents a panel in a play state so the stop button (with two parallel lines) displays.

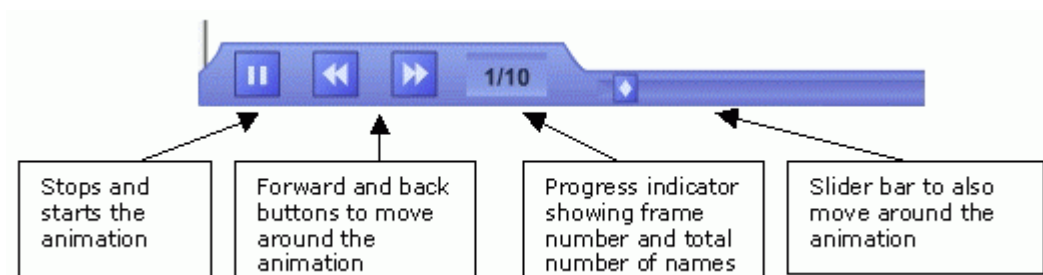


Figure 30: Online @ RMIT Version 3 iTour animation control panel

The third major iteration of the design was made by the designers who had by now formed a separate group RMIT Educational Media Group (EMG). The changes to the design were made available to RMIT students in 2004. For an example see Version 2 'Final' in the iTour Project web site.

Instructions	To find the version two iTours, go to the iTour Project web site then select Sub-project 3 followed by Version 2 'Final' .
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7.4 Summary of design

This sub-project consisted of two major design cycles and a series of smaller ones. An overview incorporating the timeline is provided below:

Table 32: Online @ RMIT iTour design timeline

Date	Description	Note
Nov 2000 to Mar 2001	Prototype Development—paper prototype, prototype 1 and 2, draft version, Version 1.	Released to students for start of academic year.
Sep 2002	Conducted usability testing.	Found control was required.
Nov 2002	Version 2—four prototypes were created for further usability testing.	Developed in response to usability testing.
Nov 2003	Conducted second round of usability testing.	Further fine-tuning required. For example, text box colour change required and the slider bar needed to look more like a slider bar.
Nov 2003	Prototype of Version 2 using third-party software for developing iTours.	Tried to reduce development time and change the responsibility of development from the multimedia team back to the technical writers. Attempt failed, as the control panel could not be easily changed so decided to use this tool for communication instead of paper prototypes or storyboards. Used this for new iTours. For smaller changes used email to describe the changes.
Dec 2003 to Feb 2004	Version 1b	Time was running out to release the iTours for the start of the year. Did not have time to implement changes from previous usability update so made changes to the original Version 1 resulting from software upgrades (CourseInfo 4 to Blackboard 5; plus Learning Hub changes).
Mar 2004	Prototype Version 2 with second third-party iTour development tool.	Attempted to use another development tool to produce the code. Outcome looked good. Problem: resulting code was too large to be downloaded via a modem.
Jan 2004	Prototypes—new iTours	Created prototypes of two new iTours using third-party product and distributed for comment. Problem: resulting code was too large.
Apr 2004	Working Versions—Version 2a	Created using third-party product, but again the attempt failed, as the resulting code was too large.
May 2004	Working Versions—Version 2b	Implemented changes again this time developing using Flash code directly. One significant problem was that one does not have time to read the last text-box in the animations before the animation is greyed out. Requested that further time be allowed to display the last text-box before the animation ended.
May 2004	Working Versions—Version 2c	New version with bold text used for key words and different numbering approach (started from 1 not 0 in the slider bar) included simplifying the programming.
May 2004	Working Versions—Version 2ci	Allows last text box to display for longer before greying the simulation.
May 2004	Working Versions—Version 2cii	Final change. Allows last text box to display for even longer before greying the simulation.
Feb 2005	Working Versions—Version 2d	Updated the Blackboard iTours to show Version 6 of Blackboard.

7.5 Outcome

This project commenced in 2001 and remains dynamic. The cost of the animations was initially \$A1200, to produce the first 13 iTours. The rest of the costs were absorbed internally as staff time.

The research was descriptive using design action case study and was longitudinal, allowing for the research cycle to evolve over time. Data were collected via a diary and communication exchanges with the designer; the resulting documentation and iTour versions; and my reflections.

Formative evaluation or assessment occurred along the development cycle in the form of verbal project briefings to management and the development team, through the design, development and testing phases. Further formative evaluation was conducted through two sets of usability testing with review and discussion on the resulting reports; release of each version of the animations and discussions on their progress and changes; reports sent to management on the progress of the iTour project and interim results of development; feedback through statistical analysis of iTour usage on the production system; and reflection and progress was recorded in my journal.

Summative evaluation took place when the final version was released into production and then underwent extensive usability testing. The project outcomes were presented in a peer-reviewed paper published in the journal *Southern Communicator*, for the Australian Society of Technical Communication and New Zealand Society of Technical Communication, December 2004 (Weiss 2004). The paper was also peer reviewed by the Society of Technical Communication (STC) Australian Branch and given an award of Excellence in 2005. The iTour design was peer reviewed by the STC (Australian Branch) and was also given an award of Excellence. Summative evaluation was achieved through putting the iTours into production for 47,000 RMIT students who use the Online @ RMIT. The products have been in production since 2001 and receive ongoing endorsement from DLS management to keep offering them to students.

The design was reviewed for accessibility by another researcher who has been involved in working groups of the W3C, focusing on accessibility, since 1997. From 2000–2004 he was co-chair of the Web Content Accessibility Guidelines working group. He has also participated in the technical committee of the Daisy Consortium, and was an observer, from 1993–1996, on the International Committee for Accessible Document Design.

He found that attention had been given to the overall accessibility. He said: "Attention has clearly been given to accessibility in so far as the text version exists, and the ALT attributes are present, offering brief descriptions of the images." (White, J. to Weiss, A., pers. comm.,

19 January 2004). However, he did advise that for a person who cannot see the interface, the iTour would be more beneficial as a replica of the interface itself. "It would be more worthwhile, I suspect, if the real forms were included in the text tour, with the same fields etc., that appear in the real software, and some degree of interaction was provided. The challenge is to not only recreate the image but enough of the underlying interface to satisfy this requirement." (ibid.).

This exegetical chapter on the iTours was reviewed by the graphic designer/new media programmer involved in Version 1, who responded: "I thought you captured the process very well. The only feedback I can really give is that I thought it was well written, clear and concise". The graphic designer/new media programmer involved in Version 2 commented: "This provides a comprehensive analysis of the various stages of your project." This feedback was a positive review of this exegetical summary.

As recommended by Creswell (2003) and described in the Methodology chapter in the section commencing on page 29, validity was achieved using all of the eight possible ways:

1. Triangulation of sources on designing the animation—the sources being the multiple designers, usability experts, and staff who write for and train students in using Online @ RMIT; triangulation of methods in the testing to prove the effectiveness which included a questionnaire, observation, and a debriefing session;
2. Member-checking by reviewing the outcome of the usability testing with the students, and having staff members involved in the project review this current chapter on Sub-project 3;
3. Rich, thick description of the findings;
4. Providing open and honest narrative that showed I was finding my way with this design problem—my bias was described to the usability testers, and was incorporated within the research through the report on usability testing;
5. Negative information included such as issues with development like the failure of the lack of navigation control;
6. Spending prolonged time in the field;
7. Using peer review process with the Australian Society of Technical Communication to review the outcome, and using rigorous usability testing; and
8. Collecting feedback on design through the competition and public presentation at the Australian Online Documentation Conference 2005 (Weiss 2005)—these were external auditors to the design outcome.

Rigour was ensured by following all seven key strategies advocated by Baskerville and Wood-Harper (1996) including: using an appropriate methodology, in this case design action research; the research was valid; participants who worked on the project were informed of the research; data collection was planned through diaries, reports, result of competition, low- and high-fidelity prototypes and production of design; careful collaboration was maintained with other designers; the action research was cyclical containing multiple cycles over a 4-year period; and generalisations were made and documented in this chapter.

This test also followed the guidelines for ensuring experimental rigour as described by Rubin (1994, p.93):

- Employing an adequate number of participants;
- Being consistent from test to test;
- Confirming the characteristics of the participants; for example, RMIT students with some computer experience but limited knowledge of CourseInfo;
- Noting any unusual problems with the test;
- Having specific goals or objectives in mind;
- Conducting a pilot test;
- Keeping it simple; and
- Making the testing environment as realistic as possible—equipment similar to that found in RMIT computer laboratories was provided.

The RMIT iTour animations were available to 47,000 students and were used on average by 747 students per month, with a maximum of 1224 during peak times. Visits were on average 642 more per month or 7.5 times higher than for the text-based documentation. These figures are from the RMIT web site statistical report feature (Giznow) and include activity from June to November 2003, for review in 2004. This was a critical time in the life of the project to measure its success, as the future of the iTours was under review. The numbers suggest that this genre is popular with students and is a viable alternative to the more traditional text and graphic documentation.

7.6 Key findings

The findings from this project pertaining to design and testing of the iTours are:

1. In iTour design there can be conflict between what the designer wants the viewer to do or see, and what the user wants to do. The designer may want to keep the viewer within the demonstration, and not give them any control until the animation finishes playing. However, as this example has shown, users must be given control;

2. Storyboards are not always the appropriate medium for animation design, especially if the writer is new to animation. Prototyping can be easier;
3. Technological restrictions should be evaluated either by the user or supplier before starting to design the animations. The animations described in this Exegesis were designed to run on 56k modems;
4. Focused usability testing is necessary to discover or confirm the iTour's strengths and weaknesses; this testing needs to be done at key times such as after prototyping and on design drafts, where time is spent observing a person using the iTour;
5. Testing by asking colleagues to give you feedback is not usability testing. Usability testing should follow a process that is a tested process itself; for example, Rubin (1994) or a simpler process such as Krug (2000);
6. Colour coding was useful in content analysis to categorise and process freeform feedback from usability test results;
7. When conducting content analysis the comments were processed by question, by participant, and by grouping the area of response. The latter processing gleaned the most useful information for this project, in terms of processing the results;
8. When designers borrow from existing industry standards, they should use the same icon design and navigational behaviour because variation can confuse the end user;
9. Users need to always know where they are and receive enough feedback regarding the state of the animation;
10. Documentation associated with the iTour should be clear and tell the user what the iTour is about, how to start it, how long it is, and any special instructions such as how to control it with a keyboard; and
11. For improved visibility, text boxes that look like alt-tags should not be used; for example, if it is a pale yellow outlined in black with black letters.

This concludes the research and design summary for Sub-project 3, which focused on designing and testing Online @ RMIT iTours. The next chapter describes the development of the Guidelines. This will be followed by Analytical Review 2 to compare the Guidelines against working iTours, prior to presentation of the Conclusions and Recommendations.

8 Guidelines

8.1 Introduction

This chapter provides an overview of the development of the Guidelines and key points established during their design. The iTour Guidelines were created to provide a conceptual, structural and operational framework (see Peterson 2004) for iTour designers to assist them with designing and testing iTours. The framework draws on knowledge acquired through my research and practice in designing and testing iTours, analysing other third-party iTours, and researching comparative fields. The comparative fields include online technical documentation, web, new media, software, and usability design.

As shown in the following diagram, the guideline development occurred after considerable time had been spent on design and testing processes, creating the opportunity for further significant reflection.

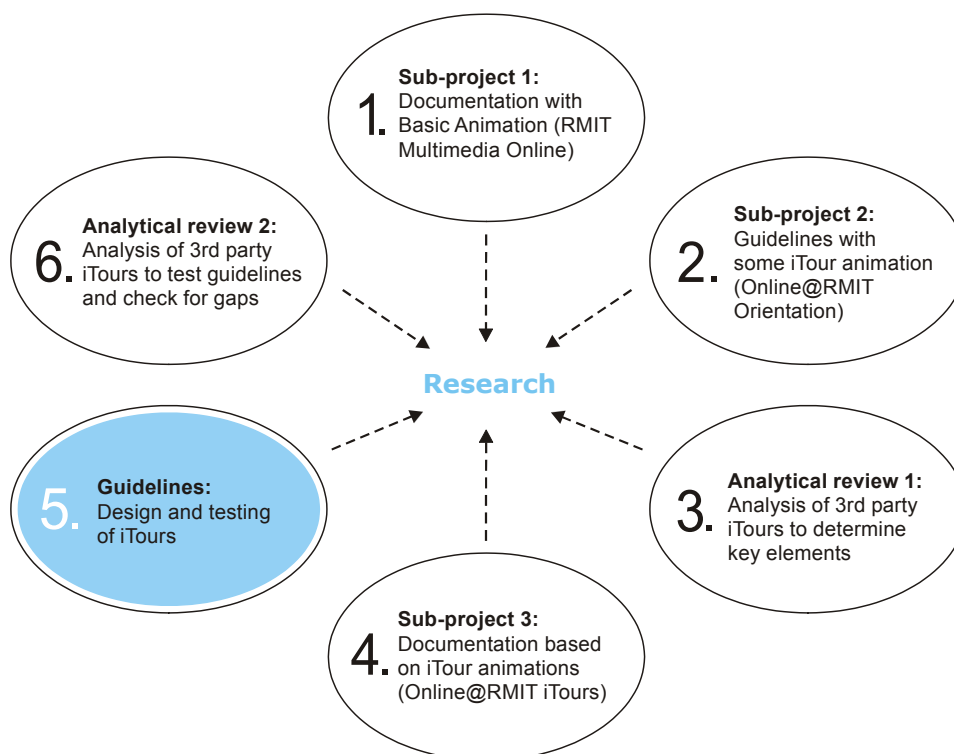


Figure 31: Research activities emphasising the Guidelines

Design may be creative and difficult, and adding multimedia to text-based documentation design adds another level of complexity. As such, I felt that providing the outcome of the projects was not enough and that my findings should be assembled into a set of Guidelines, a format suitable for the technical communication community. This was a crucial part of the summative phase. In this way the outcome would be organised for someone looking for

general Guidelines rather than information specific to one project. Guidelines also help designers by focusing their attention and encouraging exploration of a range of options (see De Jong and Van Der Geest 2000).

The Guidelines incorporate synthesised discussion from different fields including online technical documentation, new media, web, and usability design and testing, and were influenced by software development and testing. The Guidelines drew heavily on these fields, as iTours had no substantial field of literature of their own. This borrowing assisted with the articulation of design ideas and features and was useful in drawing out and making explicit knowledge that was implicit (see Downton 2003).

In addition to this theoretical base, these Guidelines provide the results of practical hands-on research conducted throughout a 7-year period. As a summary synthesising broad theoretical and practical work, the Guidelines provide new perspectives and expand the view of what is possible, or possibly confirm the approach that you were going to take (see Krull 1997).

The research not only provided a set of Guidelines, but within the Guidelines a set of examples and empirical techniques for assessing progress; for example, by usability testing. Carroll (1990) emphasises the importance of the examples and techniques and for assessing progress, so the user of the Guidelines does not change a highly creative work into a “mechanical” process (p.304).

In accordance with de Jong and van der Geest (2000), the Guidelines primarily used a requirement format (“All elements should be clear and easy to read”) although occasionally they used an instructional format (“Use concise dialog in the voice-over”) for variation. Initially a question-based format (“Is concise dialog used in the voice-over?”) was used but as initial reviewers objected to it, it was changed. The formulation should not affect the “use and yield of heuristics” (ibid., p.314).

8.2 Background

Thought, design, research and analysis conducted over many years during my research contributed to the Guidelines. The following table provides a summary of the background leading up to the formulation of the Guidelines presented with this research. Each item under ‘activity’ can be linked to a document within my PhD archives. The blue rows indicate a sub-project.

Table 33: iTour Guideline formulation history

Year	Activity	Description
1998	Developed OMP documentation with animation (Sub-project 1)	Developed the first sub-project for this research.
Nov 1998	Interim Guidelines	Developed a set of Guidelines where the focus was on designing. These were very elementary with a strong emphasis on the technical communication approach.
Aug 1999	Guidelines prepared at the start of the Orientation Sub-project 2	These Guidelines were written as a preliminary design document. They were very sparse and were prepared at the start of the Orientation project to assist in documenting my design knowledge to date. As the project progressed, the design understanding became much more sophisticated: see Orientation Design Document.
Nov 1999	Research on the Design of Interactive Online Documentation	This was a paper investigating design of interactive online documentation. It was presented at the Australian Society for Technical Communication (Vic) Conference in 1999.
1999–2000	Developed Orientation (Sub-project 2)	Developed the second sub-project for the research.
Aug 2000	IEEE and STC Journal Research on the Design of Interactive Online Documentation	Expanded the previous paper to search for guidelines on multimedia within the IEEE journals and available textbooks. The research focused on the realm of what technical communicators, or those people who write for these journals, are writing about multimedia.
Nov 2000	Analytical Review 1	Analysed Online @ RMIT Orientation, Westpac and Macromedia Dreamweaver help in preparation for the next sub-project: the iTour development.
2000–2005	iTour development (Sub-project 3)	Developed the third sub-project for the research
May 2001	Criteria for analysis and evaluation	Documented reflections on research to date and conducted more in-depth exploration of accessibility through the W3C guidelines.
July 2001	OMP Analysis	Commenced an in-depth analysis of the OMP documentation with animation to provide a breakdown of the design components and information on how it was designed.
Dec 2001	Guidelines and Research	Prepared a summary of my knowledge on design and designing online interactive documentation with multimedia, in preparation to request an upgrade to a PhD.
Dec 2001	Interim Criteria for Analysis and Evaluation	In the criteria, starting to more deeply review and think about the research that I had written up in the “Research on the Design of Interactive Online Documentation” (see Grice 1995; Mason 1997; Hailey and Hailey 1998; Rosenbaum and Bugental 1998; Tomasi and Mehlenbacher 1998; Bunn 2000; Cohen 2000) and delved further into accessibility, navigation, voice, text, and animation.
Aug 2001	Online @ RMIT Orientation report	Prepared the analysis of the Online @ RMIT Orientation from notes I had compiled on the sub-project.
Dec 2002	Analysis of the development of the Online @ RMIT iTours Usability Test #1 Usability Test #2	Analysed the development of the Online @ RMIT iTours, closely reviewing both the iTour’s resulting physical design and the process of designing. Documented the two usability tests that followed Rubin’s (1994) methodology.

Year	Activity	Description
June 2003	Further evaluation and comparison points	Commenced preparation for Guidelines by: Reviewing existing research; Continuing review, especially on hypermedia design and user interface design (see Grudin 1989; Garzotto, Mainetti and Paolini 1995; Neale and McCombe 1997) Reviewing research on accessibility; Preparing a table to summarise information gathered—start of thematic analysis; In addition to the table, starting to prepare list of points under suitable headings. Continued looking at other examples for inspiration.
June 2003	Evaluation and comparison research 2	Proceeded to research works on: Metaphor design (Marcus 1996); Section 508 interpretation (DMD 2002); Animation tutorial: McMillan and Hobson 2001; http://www.jointadlcolab.org/v2/guide/animation.htm Usability (Grayling 2002); further guidelines and heuristics (see Mehlenbacher 1993; AusInfo 2000; Microsoft 2000a; Microsoft 2000b; Tognazzini 2001; Kantner, Shroyer and Rosenbaum 2002; IMS 2003; Nielsen Norman Group 2003); mapping cyberspace (Dodge and Kitchin 2000).
June 2003	Concept map example	Created a series of concept maps to categorise and group information on iTour design. These evolved over a 1-year period.
Nov 2003	Ongoing thematic analysis	Continued to review research including IBM (1999).
Nov 2003	Navigation notes	Focused on navigation only to define a subset of the Guidelines in preparation for a paper on this subject.
July 2004	Further evaluation	Further evaluation and reflection. Reviewing older references again in regards to general hypermedia design and relationship with the user (see Salomon 1979; Redish 1988; Balasubramanian 1993; Horton 1994; Selber 1995; Gribbons 1996; Chapman and Chapman 2000).
July 2004	Further thematic evaluation	Reviewing previous technical documentation and new media guidelines as well as Shneiderman and Kearsley 1989; Nielsen 1994; Rubin 1994; Nielsen 1995a; Perlman 1997; Schofield and Flute 1997; Vetere 1997; Shneiderman 1998; Stewart 1998; Truchard and Katz-Haas 1998; Lynch and Horton 2001; IMS 2003.
Jan/Sep 2004	Towards Navigation Guidelines for Online Interactive Animated Software Tours Concept map Level 1, 2, 3 (level 1 = least detail; 3 = most detail)	Decided to focus on the Guidelines for the navigation to simplify the thematic categorisation and organisation by working on a subset of the Guidelines. Paper in process. Also used concept maps to organise and group themes. The levels 1 and 2 of the 3-level concept map are shown after this table.
Sep 2004	Guidelines	At this point started to document Guidelines.
Jan 2005	Comparison 2 Comparison 3	Explored two external iTours plus revisited the Orientation iTours, deconstructing the screen elements to study them more closely. This was done to try to work out what the components were that made up the iTour and what was important.
Aug 2005	Guidelines	Completed Guidelines and sought feedback from the local Victorian technical communication community and multimedia developers.

The following shows an example of the concept map used to organise and group themes, when preparing the navigation guidelines (see row pertaining to Jan/Sep 2004 in Table 33). The diagram shows two of the possible three levels of concepts starting with the highest; for example, “1. Clear?” then the next level “1.1 Easy to see?”. This approach was used in the Element part of the design to organise the general design themes.

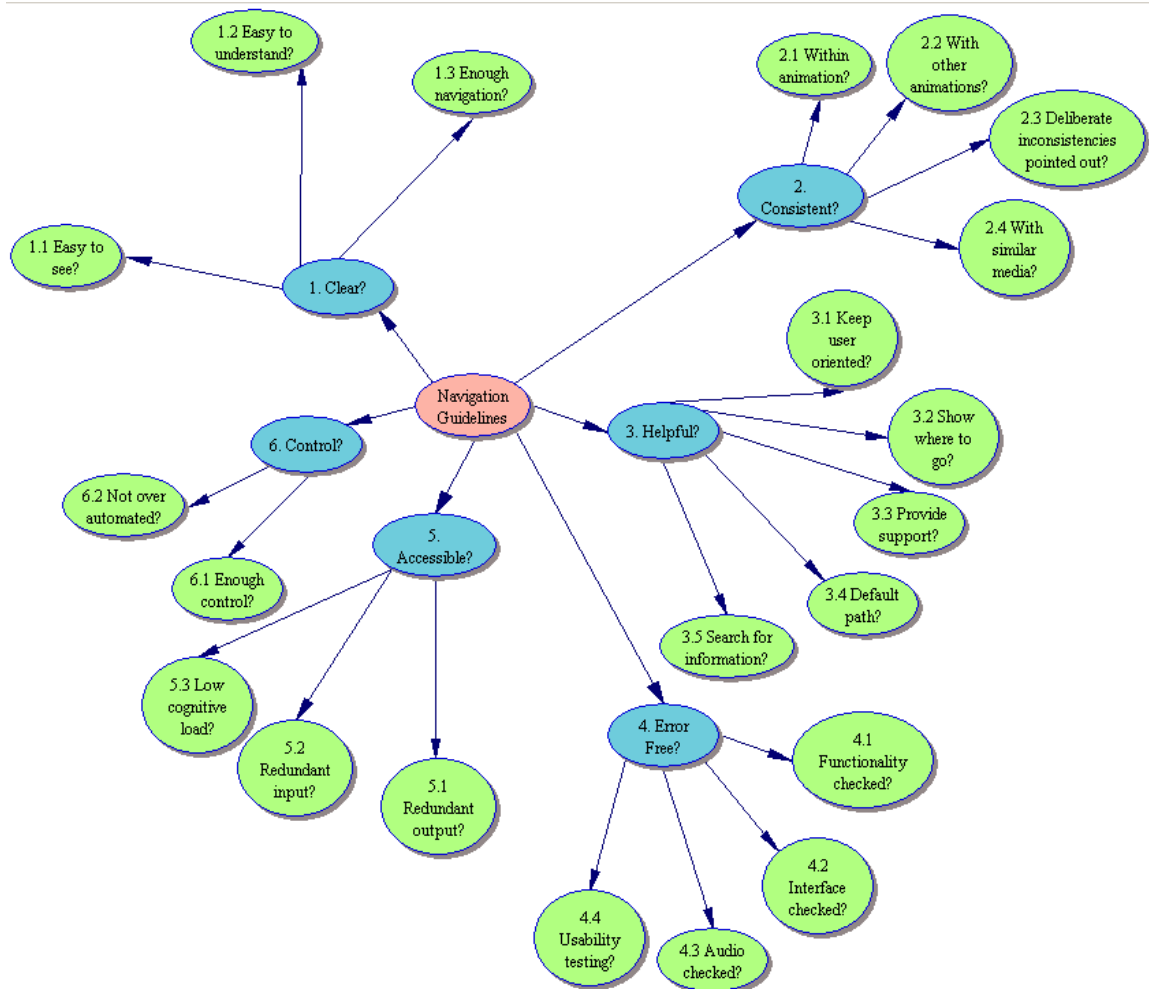


Figure 32: Navigation design theme concept map

8.3 Overview

The Guidelines are divided into a number of sections: introduction; quick guide; themes; processes; elements; examples; and references.

Each section of the Guidelines is now described and can be examined in detail in the web site. Where relevant, the researchers or approach that influenced the relevant section is included in the following descriptions.

Instructions	To find the Guidelines, go to the iTour Project web site then select Guidelines .
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8.3.1 Introduction

This section introduces the Guidelines, defining the term ‘iTour’ and explaining the aim of the Guidelines and what they include. The Introduction also explains the intended audience for the Guidelines; how the Guidelines should be used; how they were developed; and what they do not cover.

8.3.2 Quick guide

This section provides a concise overview or map of the Guidelines, and links to each section. It was provided as a site map for the convenience of the user.

8.3.3 Themes

From the Guidelines, a set of overarching guiding design themes has evolved as follows. The design should be clear, integrated, structured, concise, consistent, helpful, error free, controllable, accessible, approachable, updateable and searchable. These design themes were established from the design and test Guidelines, which in turn were drawn from the literature review, three sub-projects, and the analytical review of third-party projects, as shown in Figure 33:

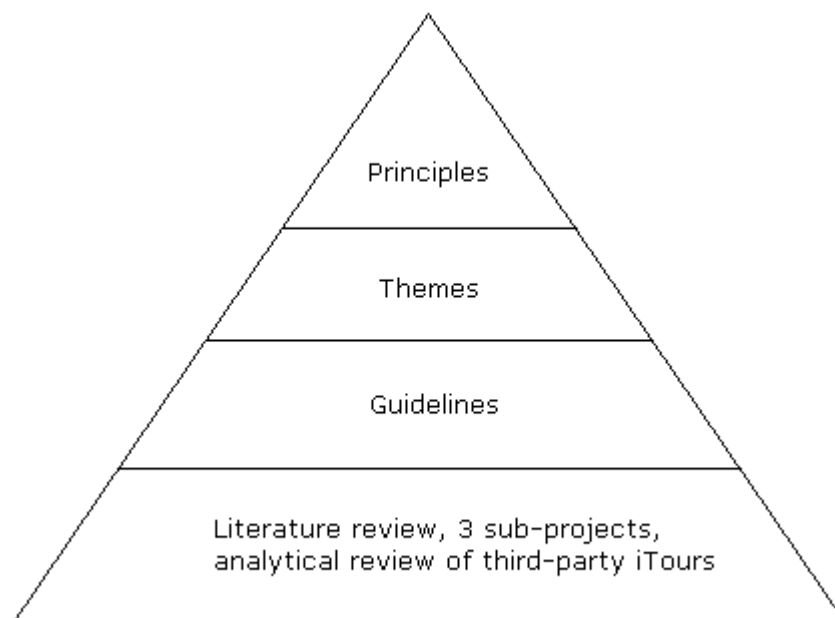


Figure 33: Guidelines resulting from thematic analysis

8.3.4 Processes

In this section there is an overview of the PDIOR (planning, developing, implementing, observing, and reflecting) design cycle used in this research and a description of each phase. The cycle is a mix of design and action research (see Design action case studies, page 24). The elements of the cycle are influenced by a combination of technical communication design and testing, and new media design and testing including software.

An example of an ideal cycle is shown below. The steps in this cycle result from experience with the past sub-projects; research into other fields; and an opportunity to reflect on what should have happened versus what did. This cycle differs from the previous ones as it is the most comprehensive, combining steps from each of the previous sub-project cycles plus the research. The most significant change is that usability testing is applied all through the process, after prototyping as well as during and after product development.

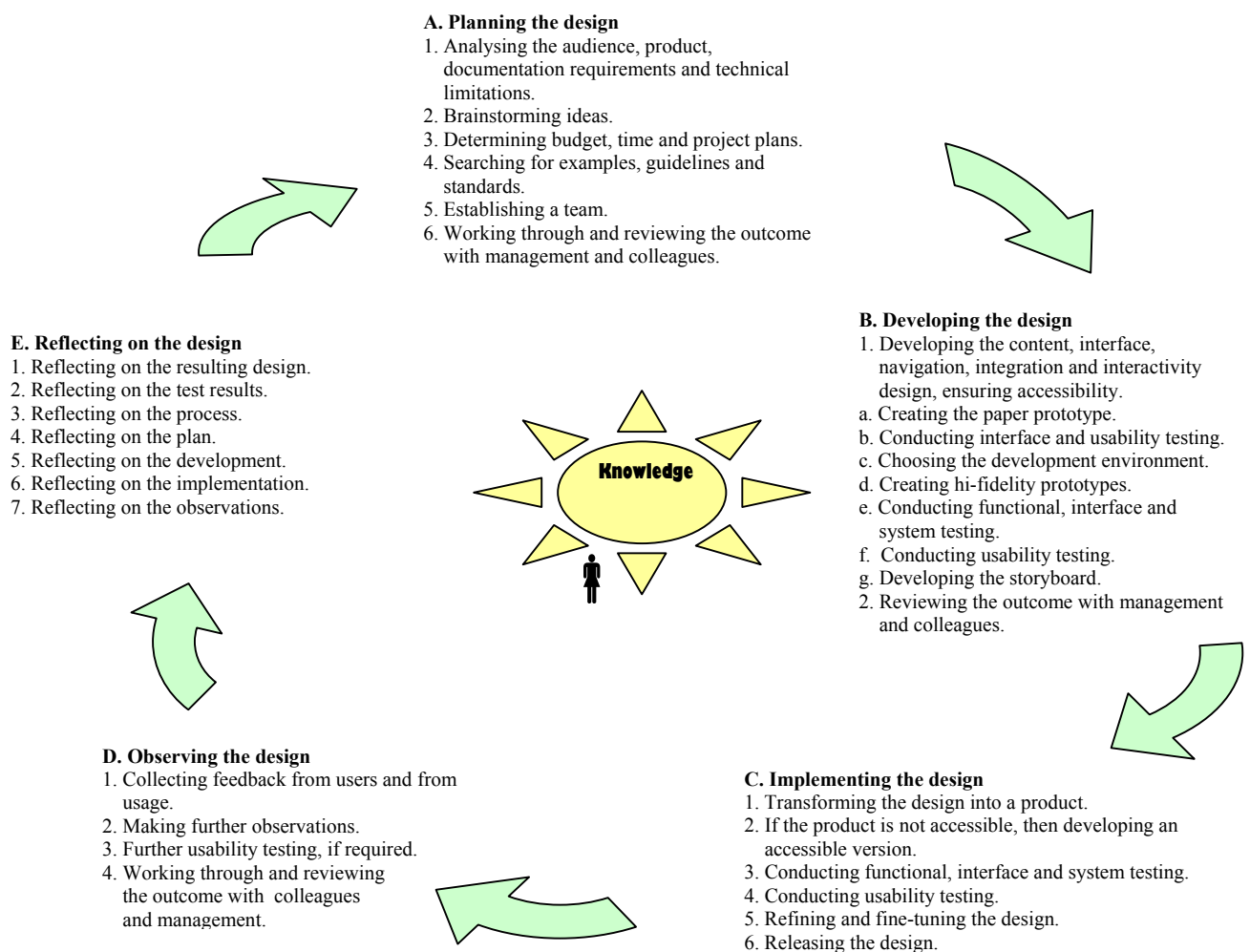


Figure 34: iTour PDIOR design cycle

The iTour PDIOR (planning, developing, implementing, observing and reflecting) design cycle is simplified to show the basic phases. It emphasises design and testing, as well as observing and reflecting which are an important part of action research cycles and of designing. Project cycles are usually focused on action, doing and reporting (see Chapman and Chapman 2000; Elin 2001; England and Finney 2002a; Barfield 2004 for examples of the activity-focused approach to developing multimedia). However, thinking and reflecting on the design is also important (see Schön 1991; Dorst 2003; Downton 2003) and should be incorporated.

Technical communicators coming from a training background may use an ADDIE model (analyse, design, develop, implement, and evaluate) to develop material, and include a phase for evaluation to determine the success of their product and the success of the participant (Dick and Carey 1990). The observing and reflecting phases in the iTour PDIOR design cycle are not focused on 'success' but on both the successes and failures, and other observations that cannot be classified as either. Evaluation can form a part of this observing and reflecting, but is a subset of these two activities rather than a separate activity.

Table 34 shows the source of influence on each part of the design cycle:

Table 34: PDIOR design cycle influences

Phase	Steps	Area of Influence
Phase A: Plan the design	Steps 1–2: Identify audience, product, type of documentation, and technology constraints.	Influenced most heavily by the technical documentation design approach, in terms of the order of steps and approach.
	Steps 5–8: Search for example, brainstorm, plan, assemble team.	Main influence is from multimedia projects, although resembles larger web-based technical documentation projects.
Phase B: Develop the design	Steps 1–3: Develop all aspects of the design including: content, interface, navigation, integration and interactivity design, as well as ensuring accessibility throughout.	Influenced by multimedia development.
	Exceptions: Section relating to content development Section relating to testing.	Influenced most heavily by technical documentation approach to developing content. Influenced by multimedia testing, which itself is a combination of: 1) technical communication testing where the written and spoken English is checked; 2) software testing, where the functionality and interface is tested, then checked on different technical environments.
Phase C: Implement the design	Steps 1–5: Transform the design into a product then test and refine it.	Influenced by multimedia and usability testing.
Phase D: Observe the design	Steps 1–2: Collect user and usage feedback plus making further observations.	Influenced by design and action research.
Phase E: Reflect on the design	Steps 1–7: Reflect on all aspects of the design process as well as the physical design.	Influenced by design and action research.

8.3.5 Elements

This section focuses on the design of the iTour interface; structure; and technology. The different components that comprise iTour design are identified, as illustrated in the table below:

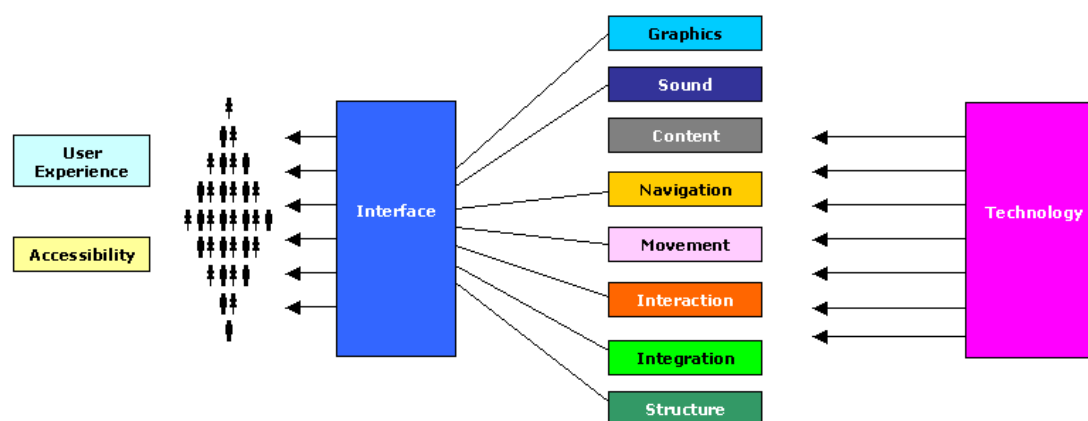


Figure 35: Overall Guideline design

The elements of exemplary design start with the users, and include the user experience and accessibility on the top (or left) of the diagram as key areas of focus. Then the diagram shows a group of people interacting with the interface to highlight the user-centric focus. The interface is sub-divided into a number of areas including graphics, sound, content, navigation, movement, interaction, integration and structure. These are followed by the technology, which imposes a set of boundaries and restrictions including limitations on what can and cannot be included.

The framework of elements emerged from reviewing the documentation created during my direct involvement in iTour design and testing. This documentation included diaries, notes, reports, analysis documents, and results of usability testing. Added to this was analysis of other iTours that I had not designed; analysis of other forms of new media including media object players; and research in comparative areas.

To this I applied the content analysis from Sub-project 3 usability testing and the thematic analysis, to draw out the Guidelines from the research. This analysis was informed by web site guidelines, usability documentation and other standards such as W3C. I recorded the data in Word documents, initially grouping them into tables of information or into 'like' areas. However, I found that there were too many areas to manage, so I used a concept map to organise the content at a high level. For an example of the full map developed in July 2004, see Appendix 2: Concept map, on page 213. From this map the previous diagram (Figure 35) evolved. After I had a clearer view of the high-level design, I was able to return to the lower level and continue to define the components. The structure continued to evolve as I was writing the Guidelines.

Next, each of the areas within Elements is described briefly.

User experience

The items listed in user experience were sourced from Horton (1994) and Schofield and Flute (1997), and were used initially to focus the usability testing conducted during the third sub-project (see Rubin 1994). From this I thought it was essential to have a set of user experience guidelines that designers could use to focus their design work, and to which they could refer when creating an iTour.

Accessibility

The Australian Disability Discrimination Act (COMLAW 1992; HREOC 2002) makes it unlawful to discriminate against disabled people. Even without the Act, as an act of human decency, accessibility should be considered first and all through the design process. Therefore, in this set of Guidelines accessibility is considered first with user experience, and is included all through the Guidelines. In the actual design sections, unless deemed essential to separate it, accessibility is not identified as a separate design element or process. This is because I have observed on many projects that this element is left until later, 'until there is time', and so often is not addressed.

This research draws from the W3C (1999) guidelines; USA Section 508 of the 1974 Rehabilitation Act (CITA 2002); and Australian Disability Discrimination Act available at COMLAW (1992) and information from Microsoft (2000a); Microsoft (2000b); and Macromedia (2003a).

Interface

The interface section focuses on those elements that form the interface on the previous diagram (Figure 40) and which are separated and shown in Figure 36:

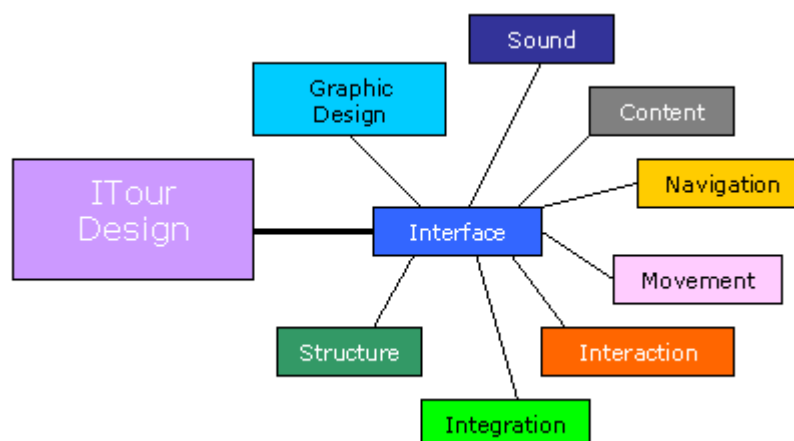


Figure 36: Guideline interface elements

Graphic design

The purpose of the Graphic design section is to focus on those elements of the iTour that should be included in the Guidelines and to provide some examples of them. It is not a comprehensive guide to graphic design. At a high level it focuses on the demonstration interface, and the navigation controls. At a lower level, it focuses on text boxes, page headings or titles, introduction and orientation information, control interface, alt-tags, captions, links, system status, the screen capture, and the cursor. The identification of the graphic design object types was drawn from experience with the sub-projects, and analytical reviews.

The general guidelines in terms of heuristics to be included were influenced by web, new media, and usability design and testing. In order to determine what was relevant, I turned to existing literature outlined briefly as follows.

The emphasis on whether the design is easy to see, was influenced by work on multimedia systems, HCI and usability (see Neale and McCombe 1997; Schofield and Flute 1997; Truchard and Katz-Haas 1998; AusInfo 2000; Hart 2000; McMillan and Hobson 2001; Tognazzini 2001; Airgid and Reindel 2002; Macromedia 2003a).

Points on understandability came also from multimedia systems, HCI, and usability studies (see Nielsen 1994; Schofield and Flute 1997; Lynch and Horton 2001), and from well-known media player examples including QuickTime, Real Media and Windows Media Player.

Design consistency had input from accessibility standards, usability, technical communication, HCI, and multimedia interface design (see Simpson 1985; Dumas 1988; Shneiderman 1992; Horton 1994; AusInfo 2000; Krug 2000; Nielsen 2000a; Nielsen 2000b; Elsom-Cook 2001; Lynch and Horton 2001; PTI 2001; IMS 2003).

Accessibility components were influenced by W3C 1999; Bohman 2001; CITA 2002; HREOC 2002; Worthington 2002; IMS 2003; Macromedia 2003b. Some input was drawn directly from QuickTime, Real Media and the Windows Media Player examples; and recent accessibility improvements to Macromedia Flash, in particular its captioning functionality. My own experience and work with iTours determined the final composition of the Guidelines in this area.

Helpfulness was inspired by technical communication, multimedia, usability testing, and accessibility (see McConathy and Doyle 1990; Horton 1994; Nielsen 1994; Rubin 1994; Nielsen 1995a; W3C 1999; Microsoft 2000a; Microsoft 2000b; IMS 2003).

I emphasised testing the functionality and design to ensure it is error free. The focus on errors in material reviewed was more on usability errors (see Nielsen 1994; Neale and McCombe 1997) or on error handling (see Dumas 1988; Horton 1988; Shneiderman 1992).

The heuristics on low cognitive load were influenced by Horton 1994; Nielsen 1994; Schofield and Flute 1997; Truchard and Katz-Haas 1998; and PTI 2001.

Sound

The purpose of this section of the Guidelines is to focus on sound (see Mason 1997; Schofield and Flute 1997; Chapman and Chapman 2000; Elsom-Cook 2001; Barfield 2004; Bennett 2005). In particular it focuses on voice-overs and mouse-click noises that came from the experience of using sound or from accessibility standards, which provide advice on using sound in computer environments (see W3C 1999; CITA 2002).

Content

This section focuses on the text-based content that is used in the iTour. Guidelines are provided for text boxes, page headings or titles, introductory and orientation information, button labels or alt-tags, links, system status and alternative text.

Language guidelines drew on my previous experience as a technical communicator and my direct experience during the three sub-projects. They also drew from the work of other technical communicators, web and multimedia guideline designers, and usability experts (see Simpson 1985; Queipo 1986; Dumas 1988; Rojas-Fernandez 1991; Shneiderman 1992; Horton 1994; Nielsen 1994; Rubin 1994; Hackos and Stevens 1997; Perlman 1997; Schofield and Flute 1997; Shneiderman 1998; Truchard and Katz-Haas 1998; Lynch and Horton 2001; Farkas and Farkas 2002; Thissen 2003; Gregory 2004) and accessibility guidelines emphasising redundancy (see W3C 1999; AusInfo 2000).

Content guidelines again were sourced primarily from technical and multimedia communicators, and some usability researchers (see Dumas 1988; Redish 1989; Shneiderman and Kearsley 1989; Rojas-Fernandez 1991; Horton 1994; Rubin 1994; Grice 1995; Hackos and Stevens 1997; Perlman 1997; Lynch and Horton 2001; Farkas and Farkas 2002; Thissen 2003; Bennett 2005).

Navigation

Navigation objects used in the RMIT interactive online animated tours that are the focus of attention are page headings or titles, introduction or orientation information, control interface, alt-tags, and system status.

There is some crossover into the other interface elements of the Guidelines; for example, orientation information can appear under content and graphic interface, and navigation

objects are included in graphic design. However, it is important to separate this topic of navigation from the others, because the others tend to provide general advice; for example, graphic design in general, rather than focusing on the navigation aspects.

The Guidelines this time were not sourced from technical communicators but from animators, multimedia interface designers, usability experts, and accessibility guidelines (see Apple Computer Inc. 1994; Neale and McCombe 1997; Krug 2000; McMillan and Hobson 2001; IMS 2003; Thissen 2003). The sub-project research and analytical reviews of third-party products also informed the navigation aspects of the Guidelines.

This section also drew from web site navigation (see Siegel 1996; Farkas and Farkas 2000; Krug 2000; Nielsen 2000c; Farkas and Farkas 2002; Sklar 2003); from new media (see Gloor 1997; Elsom-Cook 2001; Lynch and Horton 2001; Barfield 2004); and from media object player examples of QuickTime, Real Media, and Windows Media.

Navigational consistency was sourced from usability researchers, web navigation and multimedia standards (see Simpson 1985; Nielsen 1994; Rubin 1994; Gloor 1997; Schofield and Flute 1997; W3C 1999; Farkas and Farkas 2000; Nielsen 2000b; Spyridakis 2000; PTI 2001; Tognazzini 2001; Farkas and Farkas 2002; IMS 2003).

Movement

The purpose of this section is to focus on movement within the online animations, and the overall length in terms of time of the animation. The recommendations were derived from designing, developing and testing iTours, and from working with designers.

The type of movement that generally occurs within an animation is:

- Text boxes or captions displaying, which demonstrate how to use the software;
- Screen transitioning;
- Highlights made to parts of the screen; and
- Software simulations including:
 - Moving cursors, which may select items on the screen;
 - Information being typed into a field.

This section drew largely on my own experience and observation of other iTours, and was influenced by interaction and integration guidance from the field of new media.

Interaction

Interaction in iTours usually involves interacting with the navigation objects to change the state of the animation; therefore, this section of the Guidelines focuses on interaction with navigation objects: buttons or slider bar and links.

The Guidelines were influenced, particularly in terms of consistency, by Simpson 1985; Dumas 1988; Shneiderman 1992; Horton 1994; Nielsen 1994; Rubin 1994; Schofield and Flute 1997; W3C 1999; AusInfo 2000; Krug 2000; Nielsen 2000a; Nielsen 2000b; Elsom-Cook 2001; Lynch and Horton 2001; PTI 2001; Tognazzini 2001; IMS 2003; Thissen 2003. There was some influence from new media researchers in interactivity in general (Barfield 2004; Shneiderman and Plaisant 2005), and from accessibility standards (W3C 1999) on multiple forms of interaction.

Integration

This section focuses on the integration of the parts of the iTours including the animation, text boxes, sound files, interface, and other content such as keystrokes. These guidelines stem from my own research and work with iTours. There is existing literature such as Chapman and Chapman's (2000) chapter on "Synchronization-Based Presentations". However, that chapter is presented at too deep a level for the iTour Guidelines. It describes how to program using SMIL code, and the examples are too general to be applied in my research.

Structure

From the perspective of hypertext theory, Farkas and Farkas (2002) classify five information structures including "linear, multipath, hierarchical, matrix and web-like" (p.142). When considering a single iTour, it can be classified as a linear sequence, which can have links out to other pages or other animations. As a linear sequence they would be chains or a multipath structure if they contain links.

Considering the combined structure of iTours embedded in web pages, and the fact that these web pages in turn are called from a main web page, then this structure is a hierarchy. This applies to iTours embedded within a larger multimedia structure such as in the Sub-project 2 Online @ RMIT Orientation. Sub-project 3 where a top menu links to a series of iTours is also has a hierarchical structure. An example of the structure is shown in Figure 37. This is exemplary of a tour that is a linear sequence "included within hierarchical websites" (Farkas 2004, p.334).

The next figure illustrates the structure of the iTours in Sub-projects 2 and 3.

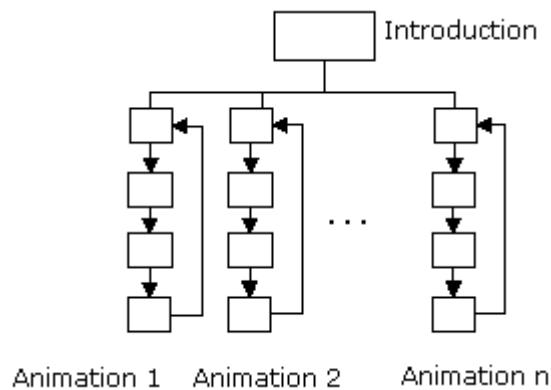


Figure 37: Hierarchical structure housing the iTours

This section drew from the outcomes of the sub-projects, the other third-party tours that were investigated, Farkas and Farkas (2002), and Farkas (2004).

Technology

The type of technology that was used for the sub-projects both enabled the project to happen and restricted it as well. For example, with Macromedia Flash one can create a sophisticated interface for an iTour; however, the technology also imposes limitations on the level of sophistication and functionality that is permissible within the end user's computer environment.

The research in this section was derived from direct experience within the sub-projects.

8.3.6 Examples

This section within the Guidelines provides links to the Project web site for examples and techniques. As recommended by Carroll (1990), so visitors can learn from the moving examples and see, for instance, how usability testing affected the iTour design. This section shows examples from the three design sub-projects including product interfaces, and from the usability testing process.

Building upon this overview of the Guidelines, the next section offers a comparison with other new media standards.

8.4 Comparison

The Guidelines are now compared with three other standards or guidelines:

1. The Guidelines for Commonwealth Information Published in Electronic Formats (AusInfo 2000) was written to encourage a whole of government 'look and feel' for

Commonwealth electronic publishing. Those guidelines focus on definitions and specifications; for example, for an electronic document, document structure, page design, and using images. Outlining best practice for government, including use of national symbols, follows this. The document does not concentrate on multimedia although does provide two paragraphs on animation, highlighting the importance of animation not causing annoyance. There is no guidance on sound.

2. Nielsen's 10 Usability Heuristics (1994), which are frequently referred to in usability and technical communication research, are compared with the 11 iTour principles in Table 35: Comparison: Nielsen heuristics and iTour design principles, on page 146.

Table 35: Comparison: Nielsen heuristics and iTour design principles

iTour 11 design principles	Nielsen's 10 Usability Heuristics (1994)
1. Aim for clarity, conciseness and minimalist approach—keep the iTour small and focused on the task.	Aesthetic and minimalist design Consistency and standards
2. Ensure that the iTour is understandable, helpful and approachable—if following a standard then follow it completely; for example, if using some of the navigation icons from media object controllers such as from QuickTime, then use all from the one source or standard.	Match between system and the real world Consistency and standards Recognition rather than recall
3. Provide sufficient navigational control and orientation information so the user knows where they are, where they can go, and how to get there; plus they know when the iTour has started and finished.	User control and freedom Visibility of system status Help and documentation Recognition rather than recall Consistency and standards
4. The iTour should be chunked, well organised and consistent.	Consistency and standards Aesthetic and minimalist design
5. Visual interface should be easy to see, run at an appropriate speed, and move smoothly.	Flexibility and efficiency of use Match between system and the real world User control and freedom
6. Aural interface should be easy to listen to, using a voice to which the user can relate.	Flexibility and efficiency of use Match between system and the real world User control and freedom
7. Consider accessibility first, not last, such as building redundancy into the iTour.	User control and freedom
8. The demonstration should show the user around the software, or how to use the software, and so should match the software being demonstrated.	Consistency and standards
9. The components should be well integrated; one step of the instructions should be seen in a text-box and heard if there is a voice-over; then this is followed by the demonstration, in which the cursor or highlighting is used to show the areas of interest.	Match between system and the real world
10. The result should be searchable. At the least give the user control so they can move around the iTour.	User control and freedom Recognition rather than recall
11. Ensure that the iTour is error free and not frustrating.	Error prevention Match between system and the real world
	Help users recognise, diagnose, and recover from errors

The comparison shows that there is a reasonable match between the iTour Principles and most of Nielsen's Heuristics. However, there is one exception to the match. The iTour

Principles do not recommend that information be provided to help users recognise and recover from errors. This could be designed into an iTour as part of the content, but is not a principle of the iTour. In conclusion, the main difference is that Nielsen's Heuristics apply to general user interface design, whereas the iTour design principles are specifically for iTours.

3. Plaisant and Shneiderman's (2005) 10 Guidelines for Recorded Demonstrations are compared with the 11 iTour Principles on Table 36: Comparison: iTour and Guidelines for Recorded Demonstrations, on page 148.

Table 36: Comparison: iTour and Guidelines for Recorded Demonstrations

iTour 11 Design Principles	Plaisant and Shneiderman’s Guidelines for Recorded Demonstrations (2005)
1. Aim for clarity, conciseness and minimalist approach—keep the iTour short, small and focused on the task.	2) Keep segments short 3) Ensure that tasks are clear and simple 9) Keep file sizes small 10) Strive for universal usability
2. Ensure that the iTour is understandable, helpful and approachable—if following a standard then follow it completely; for example, if using some of the navigation icons from media object controllers such as from QuickTime, then use all from the one source or standard.	10) Strive for universal usability
3. Provide sufficient navigational control and orientation information so the user knows where they are, where they can go, and how to get there; plus they know when the iTour has started and finished.	8) Ensure user control 10) Strive for universal usability
4. The iTour should be chunked, well organised and consistent.	10) Strive for universal usability
5. Visual interface should be easy to see, run at an appropriate speed, and move smoothly.	10) Strive for universal usability
6. Aural interface should be easy to listen to, using a voice to which the user can relate.	10) Strive for universal usability
7. Consider accessibility first, not last, such as building redundancy into the iTour.	10) Strive for universal usability
8. The demonstration should show the user around the software, or how to use the software, and so should match the software being demonstrated.	1) Be faithful to the actual user interface
9. The components should be well integrated; one step of the instructions should be seen in a text-box and heard if there is a voice-over; then this is followed by the demonstration, in which the cursor or highlighting is used to show the areas of interest.	4) Coordinate demonstrations with text documentation 7) Use highlighting to guide attention
10. The result should be searchable. At the least give the user control so they can move around the iTour.	8) Ensure user control 10) Strive for universal usability
11. Ensure that the iTour is error free and not frustrating.	10) Strive for universal usability
	5) Use spoken narration
	6) Provide procedural or instructional information rather than conceptual information

The differences are that Plaisant and Shneiderman (2005) recommend mandating spoken narration; however, iTour Principles do not, as this can be difficult to achieve if the technical communicator or multimedia designer does not have access to a sound studio. Plaisant and

Shneiderman's Guidelines also recommend limiting the type of information in the guidelines to procedural or instructional information. Although the iTours mainly use procedural information, the iTour Principles do not limit the designer in this way.

Plaisant and Shneiderman (2005) explain their ten guidelines for recorded demonstrations. Their tenth principle—universal usability (see Shneiderman 2000)—is reflected in nine of my eleven iTour design principles.

8.5 Feedback on the Guidelines

After the completion of Version 1 of the iTour Guidelines in 2005, I sought peer review. I put a request to the attendees of the Australasian Online Documentation Conference and to staff involved in multimedia development working in the RMIT IT department, the Library and in the RMIT multimedia service groups. Six communicators, four designers and one systems assurance professional volunteered to do the review and provided responses. Four of the technical communicators owned their own business; three of them lectured worldwide at conferences on technical communication; one was a discipline leader in technical communication at a tertiary institution in New Zealand; and two were experienced iTour creators. The five multimedia designers worked either now or in the past at RMIT and one was very experienced in iTour development. The person in systems assurance provided a systematic review from a layperson's perspective, rather than from a technical communicator's or new media designer's perspective.

For the peer review I requested both 'yes/no' and freeform answers to each question. Five of the eleven respondents used the freeform answers only. Of the six who responded to the yes/no questions, two were multimedia designers, three were technical communicators, and one was a system assurance expert. Their yes/no answers are summarised below:

Table 37: Guideline multiple-choice feedback

Feedback	Positive
Content	
1. Is there sufficient information on how to design iTours?	100%
2. Do the titles and headings provide clear information on what's to follow?	100%
3. Is it well organised?	100%
4. Was there anything missing?	17%
Writing	
5. Are the guidelines well written?	83%
6. Is the writing style appropriate for the audience (technical communicators and designers needing to know about this genre)?	83%
7. Is the language consistent?	83%
General	
8. What improvements would you recommend? (This answer reflects the percentage of people who provided improvements.)	17%
9. Do you think technical writers new to designing iTours will find this useful?	100%
10. Do all links behave correctly?	67%
11. Do the examples support the guidelines?	100%
12. Were the objectives of the guidelines met:	100%
a. Provide information on how to design iTours?	
b. Provide guidelines for technical communicators where multimedia was not left to the end but well integrated?	100%

Regarding the content section, all reviewers found that there was sufficient information on designing the tour, that it was well organised, and that the titles and headings provided clear information on what was to follow. Some sample supporting comments were:

- “Well done! I think this will prove quite useful.”
- “I've read through your guidelines--great job! I enjoyed reading it, and I think you've pulled together a lot of important and useful information.”
- “There's some great information in here!”
- The guidelines “are well organised and structured as displayed by sections”.
- “A very comprehensive document.”
- “User-friendly and accessible, as well as enjoyable with graphics, etc.”
- “Would appeal especially to audience of students in terms of presentation, and whether computer literate or not, would not bore them or sidetrack them into unnecessary avenues.”
- “More personal and less technical than usual, very friendly warm persona.”

Negative comments were also included:

- One reviewer provided some very insightful comments after reviewing up to page 60, which includes the introductory sections. They said: “most of the guidelines I read already apply to producing technical documentation, online help and presentations”. In hindsight, looking at my advice on paper, it seems obvious to me as well. However, it was not so obvious in the beginning when I did not have a comprehensive guide such as this. Much of the information I found provided numerous descriptions of the overall structure (linear, hierarchical, etc) and the links;
- “I disagree again, that the product always needs to be accessible—target audience will determine degree of accessibility.” With any web or multimedia design intended for an Australian audience, the Australian Disability Discrimination Act (COMLAW 1992) makes it unlawful to discriminate against disabled people. If designing for the USA, then USA Section 508 of the 1974 Rehabilitation Act (CITA 2002) prohibits US federal agencies from buying, developing, maintaining, or using web-based technology that is inaccessible for people with disabilities. Whether this person is writing for a small group that excludes the colour blind and those with other issues, is a minority situation and of course needs to be taken into account. This document is providing advice for the general populus who should follow the laws of their country.

In terms of answers relating to the writing, 80% found the guidelines well written, in an appropriate style with consistent language. One reviewer did not comment on whether the Guidelines were well written, but suggested that they could be transformed into a book, adding: “if that was your intention then you have succeeded!” However, that reviewer would have preferred to see shorter guidelines. I decided this was good advice to release a shorter version for the web.

Another reviewer found the web pages too long and would have preferred to see them chunked. The group also sent through some corrections that they found when reviewing the web site, and two made recommendations that the diagrams could be made easier to read by using different or larger fonts.

As for the questions in the general section, all the respondents said that technical writers new to designing iTours would find the information useful. They all said that the two main objectives had been met: providing information on how to design iTours; and integrating the new media information throughout. Finally, some broken links were pointed out.

Further information was included on each area as documented in the following table:

Table 38: Guideline review by area

Area	Description
Introduction	Three reviewers commented that the Guidelines were brief; provided a good overview; and a comprehensive background. Another two reviewers found it was too long and should be moved to the back of the Guidelines.
Comparison	One reviewer found this section good; another thought the Comparison “provided a better understanding of iTours”; whereas a third was unsure why I was comparing iTours with the other media.
Quick Guide	Three reviewers found the quick guide a “useful navigation tool” providing a “good overview of the content”; whereas one of these was expecting also to see a “summarised form of the guide”; and another would have liked to see a printable version of the quick guide.
Themes	This area received positive feedback on the “clear explanation of the guiding themes of iTour design”; another liked “the 12 key points”.
Process	Three reviewers provided positive feedback on the design and testing process, finding it “very informative and clearly shows the design phases”. Another reviewer said my process was similar to the ADDIE model (analysis, design, develop, implement, and evaluate). One reviewer suggested “incorporating a means for users to send feedback about the iTour”, which I had omitted.
Elements	<p>Three reviewers provided positive comments about the Elements section structure being “particularly good”.</p> <p>“I liked the diagram in Elements, which reinforces the importance of user experience and accessibility by presenting the flow right to left, rather than left to right. To me, this was saying that all elements, including multimedia, should be integrated. The Integration page was good too.”</p> <p>“As mentioned above, I liked this section a lot. The links from the diagram made it very easy to navigate, and it was easy to read and comprehend.”</p> <p>Observe and reflect phases</p> <p>One reviewer found this “particularly encouraging as this would highlight any deficiencies or errors and provides the opportunity to “fine tune” the software before the software is released. This provides an opportunity of feedback from all players.”</p> <p>Graphic Design</p> <p>One reviewer found that the structure of this topic was not easy to navigate: “what points are subordinate to what and why are some numbered and some bullets. Excessive nesting ... confusing and after I found myself often wondering what topic I was reading as I lost the flow.”</p> <p>Sound</p> <p>One reviewer, a sound specialist, said: “I focused my attention to the areas of Sound and Technical, and was quite in agreement with much of what I saw.”</p> <p>“It seemed you were saying that audio/voice took up too much bandwidth for dial-up web based users. It might have been true with this particular example, but that isn’t necessarily always the case with careful compression and appropriate usage which is mindful of bandwidth limitations.”</p>
Examples	One reviewer said there was “Too much information” whereas another found that it “illustrated the content clearly”.
References	One reviewer said it “Served its purpose well” and another thought “the list was very comprehensive and interesting”.

In the Process area, in regards to the comment on using ADDIE (Analysis, Design, Development, Implement, Evaluate), this is a well recognised Instructional Systems Design (ISD) methodology for developing new training programs. It evolved from post-World War II research in the United States military, which led to initial models in the 1960s by such early adopters as Dick and Carey (1990).

ADDIE is similar to the waterfall methodology (Boehm 1988) in that each step has an outcome that feeds the subsequent step and as such has received the same criticism “as being *too* systematic, that is, too linear, too inflexible, too constraining, and even too time-consuming to implement” (Kruse 2003). Although the iTour PDIOR (Planning, Developing, Implementing, Observing, Reflecting) approach may share terminology with ADDIE, they are very different approaches. As with the waterfall methodology, with ADDIE the design must finish in the design phase; whereas, with PDIOR design cycle, the focus is on design throughout the whole cycle.

Improvements recommended by the reviewers:

- A checklist at the very top level;
- A glossary;
- An indicator when a link opens a new window;
- Adding a design guideline to cover iTour branding, which takes up time and is annoying if every iTour starts with a marketing introduction;
- Including copyright clearance: it was suggested that even though copyright and intellectual property were not covered, it might be worth mentioning that when developing iTours of third-party products (as librarians sometimes do with databases, etc.), it may be necessary to obtain clearance to use the screenshots in this way; and
- A comparison of iTours and virtual tours.

In response to the feedback I modified the Guidelines with those changes that could be done quickly such as the copy edit changes. The other changes will be added to Version 2.

8.6 Outcome

This activity included preparing a set of guidelines summarising the knowledge I had acquired to date from hands-on activity. The outcomes include the development of a set of guidelines that provide a summary of seven years of research in the iTour field; establishment of twelve guiding design themes; establishment of nine elements that ensure a more positive user experience; and further reflection of the themes and user experience elements led to the establishment of eleven design principles.

Other outcomes include the description of a sequence of the events that make up a step within an iTour to improve usability; documentation of a design research cycle and an acronym PDIOR (Planning, Developing, Implementing, Observing, Reflecting) design cycle; and establishment of a set of steps key to testing the functionality of iTours, which is influenced by new media testing and, in turn, is a combination of software testing and copy checking.

Validity was achieved using Creswell's (2003) eight possible ways: triangulation of sources for the Guidelines from hands-on design, reviewing other designers' iTours, and through research in comparative fields; "member-checking" the outcome of findings with developers who worked on projects with me; "rich, thick description" of the findings; providing "open and honest" narrative; "negative" information such as negative feedback by the beta-testers; spending "prolonged" time in the field; using "peer review" process to obtain feedback on the Guidelines; and seeking feedback from "external auditors" to the design outcome.

Rigour was ensured by following all seven key strategies advocated by Baskerville (1996) including the use of appropriate research, in this case design action research; the research was valid research; participants who worked on the project were informed of the research; data collection was planned through diaries, reports, results of analysis of third-party iTours, thematic analysis, concept maps and production of design; careful collaboration was maintained with other designers; the Guidelines were developed over seven years using a cyclical approach of collecting, refining and reviewing information; and generalisations were made and documented in the Guidelines.

8.7 Key findings

Key findings from this phase of the research were:

1. To conceptualise iTour design, the design elements can be divided into graphics, sound, content, navigation, movement, interaction, integration and structure. There is an emphasis on interaction and integration of components, which may be a new consideration for technical communicators moving from a predominantly text focus.
2. The user experience is essential in a user-focused design approach. This process developed for iTour design keeps the user experience at the forefront through the PDIOR design cycle. Iterative reflective practice also is integral to this cycle to ensure the adequate monitoring and modification where required and where possible.
3. A balance must be found between the advantages of technology chosen to enable a successful iTour design, and the limitations imposed by the computer infrastructure on which the iTour will be run.

4. A balanced and accessible navigation approach, where the user is provided with enough control to move around the iTour, is essential to iTour design.
5. Accessibility should be integral to the whole design process and not simply considered for inclusion at the end of the process.

In presenting this chapter on the Guidelines, I have articulated their development history, and fields of influence. I have contrasted the Guidelines with “The Guidelines for Commonwealth Information Published in Electronic Formats” (AusInfo 2000), Nielsen’s “10 Usability Heuristics” (1994), and Plaisant and Shneiderman’s “Guidelines for Recorded Demonstrations” (2005). Then I provided a summary of feedback from peers, which was positive overall.

The next chapter explores the last activity in this PhD project that is the second set of analytical reviews. The reviews explore third-party iTour projects in detail, using the 169 points of the Guidelines as a framework to explore and better understand the iTours.

9 Analytical Review 2

9.1 Introduction

This second analytical review and the last activity in this project was used to compare the Guidelines against working iTours, to test that they were complete.

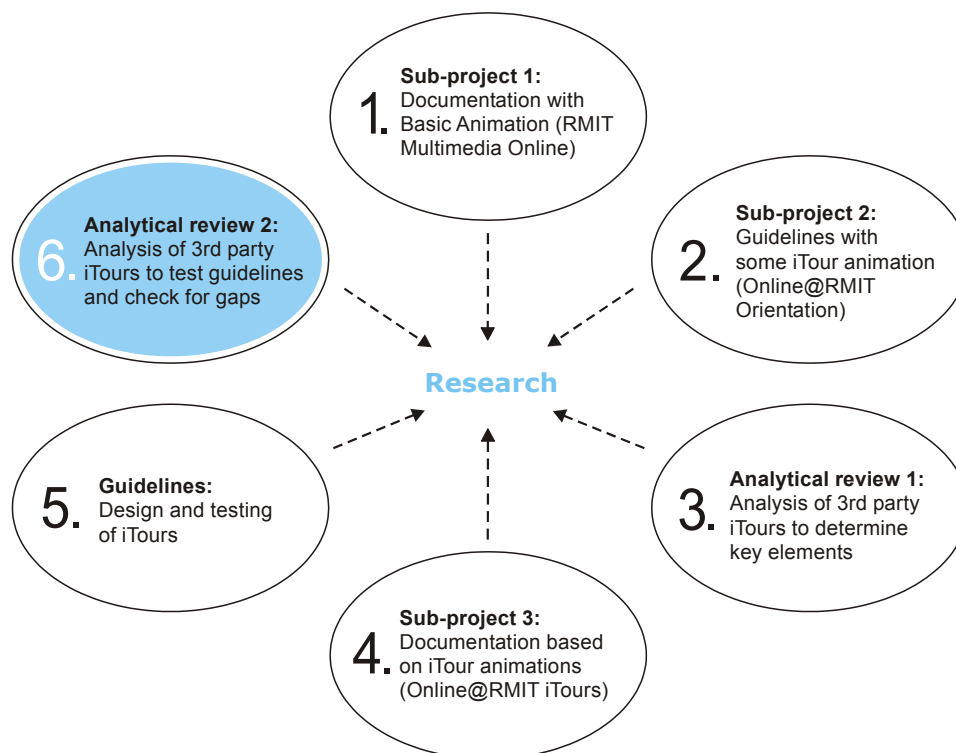


Figure 38: Research activities emphasising Analytical Review 2

For this analytical review I summarised the guidelines into single points, which formed the table that I used to analyse two third-party iTours (see Table 39). The first iTour was from Questionmark, a company that offers the Questionmark product used to design online quizzes and surveys. Unfortunately, details on the second product cannot be released due to issues of obtaining clearance. However, five key points from my learning will be provided, because these informed my overall analysis.

iTours from Questionmark were chosen for three reasons:

1. They were used to describe how to use a learning object, as were the iTours that I had worked on;
2. I was familiar with the underlying software; and

3. The company Questionmark has a reputation for producing high-quality product in general.

The second analysis referred to in this section is much more comprehensive than the first set of analyses which can be found in Chapter 6 – Analytical Review 1, on page 79. The first set of analyses was quite simple and at first investigated four types of information. However, the more I looked the more I found, so each analysis became more sophisticated. The last analysis explored nine different types of information.

As an example, in the first analysis the iTours were described under the headings: sub-heading; activity; and text. In the second analysis the description was extended to include: type. The third analysis addressed some general information, including heading, sound, and navigation, then discussed the first eleven steps in the tour including: description; activity; text; type; and user action.

Analytical Review 2 was conducted after creating three iTours and having established Version 1 of the Guidelines, so my understanding of the tours had increased significantly. This analysis was based on a summary of the Guidelines, to form the basis of the review table. The Guideline summary included 169 points grouped within fifteen areas listed below:

Table 39: iTour analytical review sub-groupings

#	Description	Example
1	General information	Name and size
2	Demonstration	Information concerning the simulation such as how was text typed in: a character; word; or paragraph at a time
3	Control	Type of controls provided such as navigational
4	Navigation	Whether the ability to move around the screen was provided
5	Graphics	Information on the look of the headings and text-boxes
6	Content	What information was included in the headings and text boxes
7	Sound	Information on the sound such as quality, and understandability
8	Structure	Length
9	Movement	Speed of simulation and cursor movement within
10	Interaction	Navigation buttons with navigation action
11	Integration	Integration of movement, visual and aural interface e.g. sound with text in text boxes
12	Accessibility	Support for accessibility such as providing enough redundancy
13	Technology	Plug-ins required, browser compatibility
14	User experience	Readable, time considerate
15	Overall Design	Clear, integrated

9.2 Outcome

In the Questionmark analysis, the guidelines were followed by deconstructing the iTour into a matrix divided into the following sections:

1. Description—name that describes the part of the iTour being studied;
2. Screen Activity—what is happening on the screen; for example, Question Manager Window displays;
3. Text Activity—what text is displayed, usually in a text box; for example, text-box displays pointing at the Add Question icon: “Click the **Add Question** icon to begin”;
4. Demonstration activity—what activity is happening on the screen; for example, text-box fades, cursor moves to the icon, and it is selected.
5. Sound—what sound can be heard; for example, mouse-click sound;
6. Type—what type of information is being provided; for example, procedural; and
7. Notes—such as if an error is observed.

A summary of the Guidelines formed a comprehensive table, useful for analysing other iTours. This table was useful for checking how closely the iTours fitted the Guidelines and where they failed.

Guidelines can be used as a framework to analyse the iTours. The framework is useful for exploring the interface in detail, and identifying and understanding the attributes that make up each iTour.

9.3 Key findings

The deconstructions led to a range of findings about both iTours, not visible when observed initially. This was followed by examples of the different screen states, including before it starts, when the animation is running, and after it has completed.

In the second product analysis, after the 169 guidelines were applied, the following useful considerations were incorporated within the overall analysis:

1. Graphic Interface—as it was more complex than the Questionmark interface and I wanted to identify its separate basic elements;
2. iTour ‘deconstruction’—sub-dividing the iTour into visual, sound and action interface;
3. Page examples—showing four different screen states: introduction; general; the visual interface when an area of interest is shown; and when interaction is required;

4. Controls analysis—those controls used in Windows, QuickTime, Real Media and this product;
5. Guidelines from the review—describing negative, positive and interesting outcomes.

Although the identity and details of the second product cannot be revealed, these points illustrate the ongoing development of the ‘deconstruction’ of iTours within my research.

The analytical review revealed that the concept of demonstration did not stand out in the Guidelines nor did the concept of approachability. This missing information was subsequently added to the Guidelines.

From all the detailed discussion of the iTour project, the next chapter draws together the conclusions of my journey in this Exegesis.

10 Conclusions and Recommendations

I will now present the summary of my research, as well as recommendations for the future. First, I will outline my research outcomes and project outcomes. Second, I will discuss my conclusions in terms of the research questions. Third, I will summarise the key findings that informed development of the Guidelines. Finally, I will reflect upon the literature review and the knowledge and experience I have acquired, then highlight implications for further research.

The aim of the research was to establish a knowledge base encompassing a practical and theoretical framework to support technical communicators and new media designers who develop iTours. The key objectives of this research were to understand the features of effective iTours; to explore the processes and techniques of designing effective iTours; and to establish new praxis in new media design for technical communication.

The project objectives were to produce:

1. A literature review of technical communication focusing on interactive online documentation design and new media design, and to find examples of guidelines if they exist;
2. Sets of animated online tours that have been designed, developed into a finished product, and tested to determine their effectiveness;
3. A set of guidelines for technical communicators to use as a reference for designing and testing interactive online tours. These guidelines would draw on experience with designing and testing the iTours; ongoing literature search; analysis of other animated documentation; and knowledge acquired from attending courses and conferences on appropriate themes;
4. A list of issues that is different in designing tours from other new media or traditional text-based design.

I will now review my research outcomes, as these supported achievement of the stated project objectives. This will be followed by a review of the project outcomes.

10.1 Research outcomes

Reflective and reflexive enquiries were central to the success of this research as they encouraged a change in my practices through a “spiral of cycles of critical and self-critical action and reflection” (Kemmis and Wilkinson 1998, p.24). The reflective and reflexive

modes of enquiry opened the way for an alternative paradigm to develop that was more in line with the actual practice, as encouraged by Fook (1996).

Through these modes of enquiry, I was able to establish **a new methodology, the ‘design action case study’**, to explore new media-based projects. This methodology is an adaptation of the ‘action case’ developed by Braa and Vidgen (1995), in which the action case study model was modified to incorporate design research, which may or may not be experimental.

The design action case worked well within the context of designing and researching the design, enabling a mix of action and design research to take place. The design action case was adapted to suit the technical communication and new media design and testing strategies required.

Within the design action case study, I formulated a design and research cycle as a framework in which to guide the activities associated with each sub-project, to ensure that they followed an easily identifiable process. This cycle was an adaptation from the work of both Susman (1983) and Sless (2000); it included planning, developing, implementing, observing and reflecting phases. I named this cycle the **‘PDIOR design cycle’** using the names assigned to the phases of the cycle to create an acronym. An example PDIOR design cycle is shown in Figure 39.

The **steps within each phase will change** from project to project, even from cycle to cycle. As I adapted the steps within the phases to suit the research and the design and testing processes, it is envisaged that this cycle can be used and adapted by researchers in other design disciplines.

One difficulty when researching within the design research field is that “a unified body of work” (Love 2002, p.345) and strong philosophical foundations have not yet emerged (ibid.). From this unsettled base and through reflective and reflexive enquiries, I was able to refine the work on current design paradigm definitions of other researchers (Rossi and Seign 2003; Vaishnavi and Kuechler 2004) and apply the **‘design enquiry paradigm’** (see Table 3 on page 17) as a suitable basis for this iTour research.

My own **research combined both the newer movement of researching through design, with elements of Schön’s** (1991) approach of observing and participating. The blended approach included viewing both other designs, and research on design, to discover the ‘truth’ (see Pura0 2002); and to create both artefacts, and facts on the artefacts (ibid.).

As I was working on design as research, I required strategies that could be applied to ensure that the research was valid and rigorous. I applied Creswell’s (2003) **validity** strategy for qualitative research, using a selection from the following: triangulation; member-checking;

rich thick description; describing the researcher's bias; presenting negative or discrepant information; spending prolonged time in the field; using a peer review process to review the research; and using an external auditor to review the entire project (ibid.). Each sub-project used a different selection of these elements to ensure the validity of the findings.

Rigour was defined in terms of the degree to which research methods follow the intended methodology (Bauer and Gaskell 2000). Rigour was applied using the seven key strategies that I adapted from action research (see Baskerville and Wood-Harper 1996) for design action research. They included:

1. The design action research was appropriate for the research question and acceptable to the audience;
2. Participants were provided with informed consent;
3. The research was valid research;
4. Data collection techniques were planned, specified and followed through; for example, information was captured in case study notes or diaries;
5. Careful collaboration was maintained with subjects so they were not dominated and their voices were not drowned;
6. The design action research was cyclical;
7. Generalisations were made, even if based on a representative sample of one.

When analysing data from this research in order to summarise in the form of a set of Guidelines, the **main technique used to reveal themes was thematic analysis**. Using this approach I was able to select the themes that applied to the research and uncover those that were not included. This was achieved by doing design, and then studying the process and the outcome at various stages of development. This work was complemented with further research in a range of fields that were similar to iTour research, including online technical communication design, information design, new media design, web page design, and HCI (human computer interface) design.

Next, I summarised and organised the themes resulting from both processes, and prepared the set of Guidelines. Then I used the Guidelines themselves as a checklist for the final in-depth analysis of third-party tours. This activity helped to identify the relevance of items included, or items that were missing. Either the Guidelines were adjusted, or the change was recorded for a future version of the iTours. This **reflective and reflexive mode of enquiry was essential to inductively drawing out design guidelines** from the specific design activity, investigative analysis and literature review.

10.2 Project outcomes

The outcome of this research by project has been to assemble a knowledge base of material for technical communicators and other iTour designers, including:

1. A Literature Summary. A documented literature search related to designing interactive online documentation; and a literature review reflective critique;
2. A Set of Examples. Design action case research led to a set of examples and discussion on the design and testing of each of the sub-projects including:
 - Online @ RMIT iTours, which supported the RMIT Online learning platform (Online @ RMIT) used by 40,000+ students;
 - RMIT Orientation distributed to 15,000 students and 5,000 staff members in year 2000; and
 - Student documentation with animation prepared for the RMIT Online Multimedia Project.
3. An Analysis Framework. The thematic analysis also led to a framework for analysing iTours;
4. A Set of Guidelines. These Guidelines resulted from the thematic analysis on research throughout the project:
 - To guide online animated tours design; and
 - To guide technical writers in testing the effectiveness of online animated tours.
5. A Summary of Differences. The overall research, including both experiential investigation and literature review, established issues that are different in designing tours versus other new media or traditional text-based design.

The outcomes resulted in awards received on each design sub-project, as well as a set of published papers:

1. Awards:
 - 2004–2005: Sub-project 3—Award of Excellence for the RMIT iTours in the Society for Technical Communication (Australia Chapter)—Category: *Demonstrations*;
 - The same project received a second Excellence award for a paper entitled “Controlling an Interactive Animated Guided Tour” in the Society for Technical Communication (Australian Chapter)—Category: *Scholarly/Professional Article*;
 - 2001: Sub-project 2—RMIT Orientation was the Third Prize winner for the 2001 competition, Australian Society for Technical Communication (Victoria) Technical Writing; and

- 1998: Sub-project 1—Student documentation for Online Multimedia Project was the First Prize winner in the 1998 competition for the Australian Society for Technical Communication (Victoria) Technical Writing.
2. Papers and presentations directly related to research:
 - “Case Study: Developing Online Guides at RMIT” (2005), Australasian Online Documentation and Content Conference, Melbourne, Australia, May 4–6, 2005 (Weiss 2005);
 - “Controlling an Interactive Animated Guided Tour” (2004), Southern Communicator, Australia and New Zealand Societies for Technical Communication Journal (Weiss 2004); and
 - “Research on the Design of Interactive Online Documentation” (1999), Ideas to Communication Proceedings: Australian Society for Technical Communication (Vic) Conference, Melbourne, Australia, November 12–13, 1999 (Weiss 1999).
 3. Work-related papers resulting from research interests:
 - “A User Centric Approach in Designing Enacted—an eLearning Tool” (2002), co-authored with Nemo, J., Milton, J. and Lyons, J., presented at the e-Learning and Design and Development Conference: International Best Practice to Enhance Corporate Performance, RMIT, Melbourne, Australia, October 21–25, 2002 (Weiss et al. 2002);
 - “Redefining Teaching and Learning Organisations: Online Learning Systems and Organisational Change”, co-authored with Quealy J., Kennedy P., Williams R. and Russo A., presented at the International Conference on Learning and Teaching Online, Guangzhou, China, January 10–12, 2001 (Quealy et al. 2001);
 - “From Genesis to Infinity or 0 to 50,000 Online Students in 2 years” (2000), co-authored with Kennedy, P. and presented at Educause 2000, Nashville Tennessee, October, 2000 (Weiss and Kennedy 2000); and
 - “Esubmit” (1999), co-authored with Gregory, M. and presented at AusWeb2K - Sixth Australian World Wide Web Conference (Gregory and Weiss 2000).

These outcomes of the research are supporting evidence that this body of work constitutes a PhD on design, as defined at the start of the Exegesis in the section entitled About PhD projects, on page xv and summarised in the table below:

Table 40: PhD outcomes

Description	Response
Contribution to knowledge on design	This has been provided through the Exegesis, including the knowledge base and Guidelines which contributed to a field that has been the focus of limited research prior to this PhD.
Design excellence	Awards for each design project are supporting evidence of design excellence.
New technology, principles or design methods	Establishment of a set of eleven principles and twelve themes specifically for iTours resulted from the research. New design methods for new media development resulted from both adapting and extending methods from other areas: design action case; design enquiry paradigm; PDIOR design cycle.
Information on how the product was originally conceived	This information was provided for each iTour and then for the overall guidelines.
Reports that reflect on the product specification	Information on the product specification was provided, in the Exegesis and web site. This Exegesis includes reflections on the specification.
Knowledge on how products were designed and how they operate	This was provided through the Exegesis, guidelines and supporting documentation in the web site.
Showcases products that have gone into production	Each product went into production: Sub-project 1 for 3 months to an audience of 100; Sub-project 2 for 1 year to an audience of 20,000; and Sub-project 3 for 5 years and is still in production, to an audience of 40,000+ per annum.
The success and impact of the final artefact (and of the preceding design process) should be measured	Success was measured in terms of distribution, and feedback both informal and formal; for example, through usability testing.
Demonstration of the critical knowledge of the research methods appropriate to the field of study	This was provided in the chapter on methodology, including both theoretical and practical approaches. In particular, the design action case study emerged as a new methodology that can be applied by other design researchers.
Submission which is subject to an examination by appropriate assessors	The submission is both this Exegesis and the web site housing the Project, that are both subject to examination.

10.3 Limitations

Some limitations were experienced during this iTour research.

On the one hand, the advantages of creating an animation project within existing real commercial documentation projects were that:

1. The design and development activities were as realistic as possible, with real constraints such as time, money and or resources;
2. The end result was useful immediately and was put into production, so the significance could be measured by “the places in which the product receives attention” (Norman, Heath and Pedgeley 2000). For iTours, this was the RMIT University online learning environment, which was a significant forum in which to display the work because of the number of students who use the online environment (40,000+).

The disadvantage was that the work and focus was tied to the larger requirements of overarching projects and of RMIT. This resulted in iTours playing a smaller role than I envisaged in Sub-projects 1 and 2.

A barrier to this iTour research was my inexperience in the field of new media. However, this was important for the research and was integral to my journey. I experienced first-hand the frustration and difficulties that other technical communicators can experience, when including new media in their documentation for the first time.

10.4 Conclusions

This research has established guidelines for designing and testing iTours by answering the following research question that guided the exploration:

What processes and techniques are required to design effective interactive animated tours?

This research question has been resolved, in turn, by answering the following underpinning research questions:

1. How do you design effective online tours?
2. How can online tour effectiveness be tested?
3. What issues are different in designing tours versus other new media design or traditional text-based user document design?

The questions have been answered over the course of the research through the research sub-projects, literature review, analysis of third-party iTours, and the Guidelines.

A summary is presented next and this incorporates the findings of my research. Each of the three underpinning research questions will be addressed in turn.

In particular, the key findings include:

1. Guiding themes for iTour design (see page 173);
2. iTour design principles (see page 174);
3. User experience guidelines (see page 175);
4. Testing process (see page 177); and
5. Issues that are different in iTour design (see page 179).

10.4.1 How do you design effective online tours?

At the start of the research, material on designing effective online tours was limited, and there were questions regarding what could be applied from guidelines available in other fields. Through my research, guidelines now exist for designing effective online tours (iTours).

Effective iTour design focuses on the user and should incorporate a user-centred approach. Such an approach includes knowing your audience, undertaking usability testing, designing in cycles, and implementing design improvements resulting from usability testing.

The project cycles used in this research are an adaptation of action research and design research cycles, influenced by technical communication design and testing in addition to new media design and testing, which includes usability and basic software product testing. The cycles were used to manage, monitor and reflect on this research. From the names assigned to the phases of the cycle, I have created the name '**PDIOR design cycle**' to represent the whole cycle. PDIOR is an acronym from the first letters in planning, developing, implementing, observing and reflecting. An example PDIOR design cycle is shown in the following diagram:

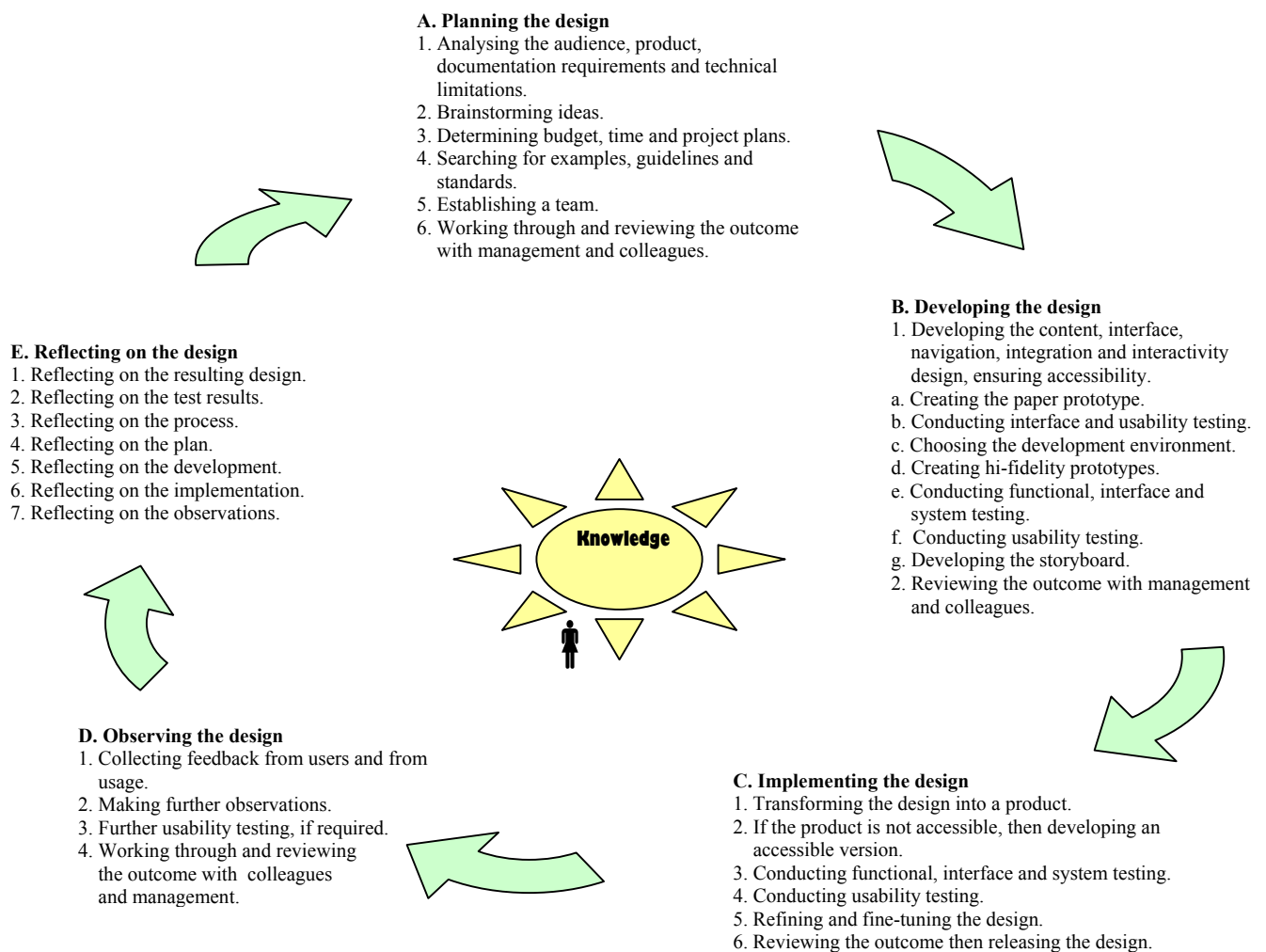


Figure 39: iTour PDIOR design cycle

Designing iTours is not restricted to one cycle. The number of cycles depends on the total design time permitted as well as the number of problems uncovered with each test. Each phase may also use multiple iterations or cycles of each step in the phase before moving on; for example, prototyping, then testing, then prototyping and testing and so on. At the same time, pacing the development or not trying to include every design feature and element in the current version is important to “finishing” the iTours, as “multimedia is always under construction and never truly finished” (Heba 1997a).

An **example set of generic steps that can be used in a PDIOR design cycle**, particularly a first cycle, was as follows:

A. Planning the design

1. Analysing the audience, product and technical limitations.
2. Brainstorming ideas.
3. Determining budget and time constraints.
4. Searching for examples, guidelines and standards.
5. Developing preliminary plans.
6. Working through and reviewing the outcome with colleagues and management.

B. Developing the design

1. Developing the content, interface, navigation and interactivity design.
This includes design of the sound, movement, integration, and structure.
 - a. Creating paper prototype.
 - b. Choosing development environment; for example, Flash.
 - c. Creating high-fidelity (hi-fi) prototypes.
 - d. Usability testing at each logical point; for example, after paper prototype developed, after hi-fi prototype.
 - e. Developing the storyboard.
 - f. Developing more detailed plans or specifications if required.
2. Reviewing the outcome with management and co-workers.

C. Implementing the design

1. Transforming the design into a product.
2. Developing an accessible version—if a separate version is required.
3. Conducting functional and technical testing, plus copy checking.
4. Conducting usability testing.
5. Refining and fine-tuning the design.
6. Releasing the design.
7. Working through and reviewing the outcome with colleagues and management.

D. Observing the design

1. Collecting feedback from users.
2. Making further observations.
3. Further usability testing, if required.
4. Working through and reviewing the outcome with colleagues and management.

E. Reflecting on the design

1. Reflecting on the resulting design.
2. Reflecting on the test results.
3. Reflecting on the process.
4. Reflecting on the plan.
5. Reflecting on the development.
6. Reflecting on the implementation.
7. Reflecting on the observations.

The design steps can vary with each project, and each cycle. In the first cycle, phase A is highly creative and focused on finding a new solution to the problem. In the second and subsequent cycles, phase A is usually focused on moving to a new preferred state, unless one is ‘throwing away’ the design and starting again. Moving to a preferred state has an element

of Fuller's Design Science Planning process, in which one defines the problem, defines the preferred state, designs the preferred system, then develops the implementation strategy (Fuller 1992).

In iTour research, design or thinking about design can occur in any phase. Activities within each phase can happen in parallel. For example, in phase A, analysing the audience and product, brainstorming ideas, determining the budget and constraints, and searching for examples, can be performed in parallel.

The design research cycle allows for a phase of observing and reflecting on the design, which is an integral activity when designing. By including this reflective time in the design cycle, the designer is giving the project team members permission to step back, reflect and observe. It is essential that planned reflection time is included or else the production group may rush into the next version, without adequately considering the previous version and opportunities for improvement.

Traditional software design using the 'waterfall' methodology consists of the following phases: analysis; design; construction; testing; implementation; and maintenance (Boehm 1988). Many designers, particularly those with a software background such as myself, may have used or still use this approach for design. Technical communicators with a training background may use a similar model known as ADDIE (analyse, design, develop, implement, and evaluate) (Dick and Carey 1990). Both approaches proceed in a linear fashion; with, for example, design finishing in the design phase, before the next phase starts.

In the PDIOR model, design is the focus of the whole cycle and so it allows design to be more organic and not limited to one phase; yet by defining phases, these can be bounded within a range of constraints as part of a project.

Constraints that the designer should take into consideration, and actively ensure that they are not exceeded, include:

- Project time available;
- Project budget;
- Product design and development team skill set;
- Technology available;
- Budget and staff availability to maintain the product after the project finishes;
- End user skill and cognitive abilities; and
- End user availability for usability testing.

When **learning how to design an iTour, this research recommends redesigning** or finding a tour style that follows suitable guidelines and is appealing, then basing the design on this

style. In this way the communicator can concentrate on the information design, spending minimal effort on the overall design. Although this approach would not be ideal in certain fields such as graphic design or advertising, where each new design may be expected to be a unique creation, this redesign approach is used and accepted by technical writers. This is where third-party design products are useful, such as Macromedia Captivate, as they encourage the communicator to concentrate on the communication, as long as the outcome is suitable and will work within the user’s environment.

Top-down design, which grew out of structured programming practices, is an approach that describes functionality at a high level; then partitions it repeatedly into more detailed levels, one level at a time, until an appropriate level of detail is reached (see Dijkstra 1969; Wirth 1971; Yourdon and Constantine 1989). With software development, the level of detail must be sufficient to permit translation into computer instructions.

The design approach used to create iTours is both top down and bottom up. With this approach the designer can monitor the top level to ensure appropriate material is being covered overall, as well as monitor the lower level design to ensure that the project does not become too big or take too long to run. As Horton (1994) says, “design top-down, build bottom-up” (p.26). An overview of the approach is explained further in Figure 40:

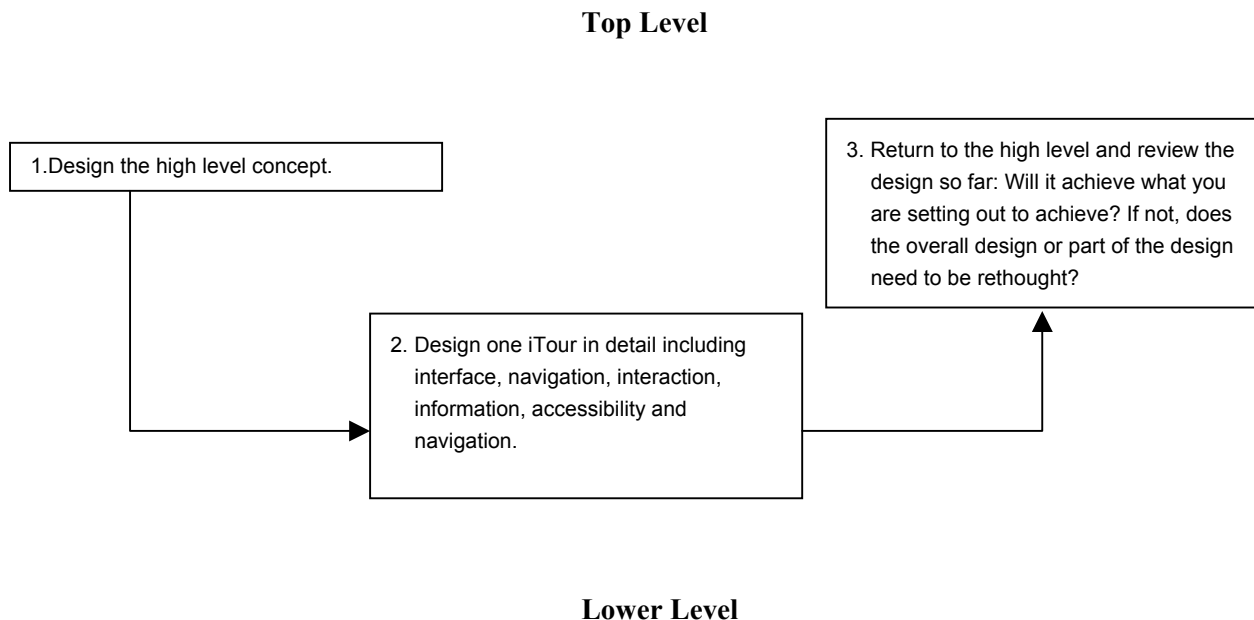


Figure 40: Design approach: top-down bottom-up approach

Prototypes play an important role in the design process and in establishing this balance. Low-fidelity or paper prototypes as well as high-fidelity prototypes, again like those created using products such as Macromedia Captivate, can assist the technical communicator in

designing the iTour. Storyboards are used to support the prototypes and can be used to communicate the animation requirements to the developers. If high-fidelity prototyping tools are not available, then there is a stronger reliance on storyboards to explain the concept in the designer's mind.

First time designers may prefer to start with a prototype and take advantage of tools such as Macromedia Captivate, Qarbon ViewletBuilder, and others to prototype, or use paper and sticky notes as described in Sub-project 3.

Designers now may choose to use a third-party product to create the final design. Before they do this they should test the outcome on the intended environment to ensure it is effective. This may sound obvious, but it is easy to dismiss this testing when one sees a working product; one can easily overlook that it may be, for example, too large for the intended environments.

It is important that **a single creative or project manager coordinate the project and copy edit the final result**, to ensure that the original vision is achieved and consistency is maintained throughout the iTours.

From these findings on the process of designing iTours, I will now summarise the findings regarding the iTour interface design elements.

About the iTour design

Twelve overarching guiding themes for iTour design emanated from this research which are summarised below:

Table 41: Twelve overarching guiding themes for iTour design

1. Clear;	7. Error free;
2. Integrated;	8. Controllable;
3. Structured;	9. Accessible;
4. Concise;	10. Approachable;
5. Consistent;	11. Updateable; and
6. Helpful;	12. Searchable.

Further information regarding the Themes see the iTour PhD web site.

Instructions	To find the key findings regarding the Themes, go to the iTour Project web site then select Guidelines followed by Themes .
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Influenced first by the guiding themes and user experience guidelines, then by Nielsen’s (1994) “Ten Usability Heuristics” and later by Plaisant and Shneiderman’s (2005) Guidelines for Recorded Demonstrations, I expanded on the themes within the specific context of iTour design to form a set of **eleven principles**. I did this to provide more guiding information for the designer rather than one-word themes. The principles, which are shown in the next table, are starting to take precedence over the themes as they provide more information.

Table 42: iTour design principles

iTour 11 design principles
1. Aim for clarity, conciseness and minimalist approach—keep the iTour small and focused on the task.
2. Ensure that the iTour is understandable, helpful and approachable—if following a standard then follow it completely; for example, if using some of the navigation icons from media object controllers such as from QuickTime, then use all from the one source or standard.
3. Provide sufficient navigational control and orientation information so the user knows where they are, where they can go, and how to get there; plus they know when the iTour has started and finished.
4. The iTour should be chunked, well organised and consistent.
5. Visual interface should be easy to see, run at an appropriate speed, and move smoothly.
6. Aural interface should be easy to listen to, using a voice to which the user can relate.
7. Consider accessibility first, not last, such as building redundancy into the iTour.
8. The demonstration should show the user around the software, or how to use the software, and so should match the software being demonstrated.
9. The components should be well integrated; one step of the instructions should be seen in a text-box and heard if there is a voice-over; then this is followed by the demonstration, in which the cursor or highlighting is used to show the areas of interest.
10. The result should be searchable. At the least give the user control so they can move around the iTour.
11. Ensure that the iTour is error free and not frustrating.

The following **user experience guidelines** were developed to ensure that the iTour provides a positive user experience. The designer is encouraged to use these as a goal when developing the iTours:

Table 43: User experience guidelines

User experience guidelines
1. Provide the information the user requires;
2. Communicate effectively, ensuring it is readable and understandable;
3. Be time considerate and not run too quickly or too slowly;
4. Ensure bandwidth issues are transparent;
5. Ensure that users can find the information they require quickly and easily;
6. Contain an appropriate level of interactivity, not too much or too little;
7. Have consistent structure, navigation, interactivity, and integration;
8. Appeal to users;
9. Do not be frustrating.

Source: Adapted from Horton (1994) and Schofield and Flute (1997)

The approach encourages user-focused design with an emphasis on accessibility being integrated with the other themes, where possible, to ensure that accessibility is applied from the beginning and not left until a later version.

When designing, the designer should focus on the **interface, technology and user experience**. The interface consists of two main parts that are closely integrated: the **demonstration and the navigation**. The interface can be sub-divided into the following components: **graphics; movement; sound; navigation; content; structure; integration; and interactivity**. The designer should understand the technology and know the boundaries and restrictions it imposes on design.

The separation of integration as a component that requires a designer's focus is important. "Text and dynamic graphics are an especially powerful combination" (Rubin 1994, p.341); but text and animation must be well integrated, support each other and work smoothly together. The two, plus sound if used, should complement, not overshadow each other. This element of design tends to be excluded or minimised in research directed towards technical communicators, who traditionally have not had to pull together a series of moving parts when they are creating documentation.

10.4.2 How can online tour effectiveness be tested?

Literature was available on testing online documentation (see Farkas and Farkas 2000 and 2003; and Gregory 2004) and on web usability design and testing, which was not restricted to a particular genre of online material (see Nielsen 1994; Rubin 1994; Dumas and Redish 1999; Hughes 1999; Krug 2000; Microsoft 2000b; Nielsen 2000a; Barnum 2002; Grayling 2002; Burnstein 2003; Nguyen, Johnson and Hackett 2003; Koyani, Bailey and Nall 2004). **The gap in the research here was on applying usability testing to iTours. There was also limited information on interface, functional and system testing,** as the popular focus was usability testing.

In the PDIOR design cycle there is no individual phase devoted to testing as exists in, for example, the traditional waterfall methodology (Boehm 1988) as the **design and product must be tested from the beginning right through until the end.** As such, testing is an activity present in each phase and step of the project such as planning, developing, implementing, observing, reflecting. Every time a design change is considered, then the designer should check that a) it meets the design specifications and requirements, and b) it will work with the rest of the design, and c) it will work within the technology. Every time a design change is made, the same tests should be conducted on the product.

Testing iTours starts with checking the initial design parameters; for example, that there is enough money for the product. Then once the design is on paper, usability testing determines if the design is effective. Early prototypes can be tested for functionality and for spelling and grammatical errors in the text, to ensure that the iTours work as the designer and management envisage, and that the iTours work in the intended environment. Production versions can be tested again for usability, for errors, and to see if each version of the iTours or the prototypes continues to work within the environment.

As with the design process, the **testing process is a hybrid** and crosses over that used in software development, user documentation, interactive multimedia and web site testing. An approach similar to that described by Morris and Hinrichs (1996) was used to test the interactive animated iTours. The steps are described in Table 44:

Table 44: Testing process table

Test Process
1. Copy editing all text and sound files including checking that correct information is provided and that the grammar and spelling is correct;
2. Testing the links;
3. Checking the interface readability and usability including the quality and speed;
4. Checking that there are no errors or bugs in the coding; for example, by checking the interactivity, navigation, and anything that can be selected or that changes with time.

Source: Adapted from Morris and Hinrichs (1996)

During this project, usability testing advanced from informal focus groups and users being asked to provide non-specific feedback, to Rubin's (1994) methodology:

- Focus groups were useful for receiving a range of opinions from staff who were interested in the projects;
- Informal peer reviews were attempted, but the response was limited and not as informed as when direct usability testing was incorporated;
- Informal peer reviews with a group of three colleagues were used first to ascertain the effectiveness of the iTours. However, the feedback was only positive; and
- Non-targeted usability testing was applied as well; that is, during a usability test, the students were shown the iTours and asked for feedback. Again, the feedback was quite positive.

The **best and most detailed user feedback was derived from usability testing following Rubin's methodology** (1994) and was applied to Sub-project 3 on two different design cycles. This type of testing was different from previous attempts to solicit feedback from users as the testing was well constructed. Testing involved:

1. Having a purpose for the test and specific questions to be asked;
2. Having a specific documented methodology to follow while testing to ensure consistency;
3. Observing the participant during testing;
4. Asking the participant to follow a think-aloud protocol;
5. Providing the participant with a questionnaire;
6. Asking them specific questions during a debriefing session; and
7. Analysing and reporting on the results.

(Rubin 1994)

Using a **think-aloud protocol**—an approach like that used by Boren and Ramey (2000) where the observer can give ‘*mm-hmm*’ tokens as feedback—can repeat single word triggers for clarification, and can encourage the user when ‘stuck’.

Usability testing was targeted to determine whether the iTours were effective by answering the specific questions about whether the documentation was usable. There was a specific **definition of ‘usable’** drawn from Horton (1994) that included:

1. Providing the information the user requires;
2. Communicating effectively; is it readable and understandable;
3. Being time considerate and not running too quickly or too slowly;
4. Ensuring bandwidth issues are transparent;
5. Ensuring users can find the information they require quickly and easily;
6. Containing an appropriate level of interactivity, not too much or too little, so that there is no control;
7. Having consistent structure, navigation, interactivity, and interface;
8. Being appealing to the users.

(Horton 1994)

An additional aspect of usability testing was:

9. Not being frustrating (Schofield and Flute 1997).

In this third sub-project where **usability testing was most rigorous, numerous problems with the product were found** that had been missed when informally reviewing prototypes with colleagues. The major flaw was that there was not enough navigation, and also when a control panel was added the navigation was confusing because it only partially followed an industry standard. The fact that one button behaved differently from the standard, confused and frustrated the testers.

Testing is an important part of the design process and should be conducted all through. Usability testing assumes importance in the process; it should be started early on and continued through the cycle. The design and resulting products should also be tested to ensure they are not flawed. This testing should extend from the interface to the functionality and should be retested on the different systems on which the product will run.

10.4.3 Differences in designing iTours versus other document types

This section contains a comparison between designing tours and traditional text-based user document design, as well as with other new media design. Further information is provided in the PhD web site.

Instructions	To find information on the difference between iTours and new media, and iTours and text-based documentation, go to the iTour Project web site then select Guidelines followed by Comparison .
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Issues that are different between designing tours and traditional text-based user document design

Text-based user documentation design shares a common information design approach with iTour design, with the exception that the content is simplified and minimised to a greater extent in an iTour. This is because there is limited screen real estate in which to present the outcome. Another major difference is that the iTour contains moving parts. Understanding how to design the communication for the moving parts and integrating the parts properly has been a significant focus of this research.

A summary of significant issues that differ between designing tours and traditional text-based user documentation is:

- The iTour content presented on each screen is more concise as there is less room;
- There is no standard interface for an iTour, unlike with online Help, although standards are emerging in the navigation controls;
- More media types must be considered within iTour design such as animation, and sound:
 - With sound, animation, and moving parts to consider, the composition of a basic procedural step is more complex; and
 - Working with media, the preparation differs in that preparing iTours relies on prototyping and storyboards.
- iTours have both navigation and a demonstration to consider when creating;
- Navigation differs in that the navigation used in online help is used to move between different topics, whereas the navigation used in the iTour is provided to predominantly move around the demonstration itself; and
- It is easier to print online help, which is predominantly text-based than it is to print an iTour with its use of animation and sound.

Issues that are different between designing tours and new media

When designing iTours there are both similarities with designing new media, and differences, depending on the type of new media being designed. Prototyping and storyboarding are a shared technique. However, the purpose may be very different such as in designing a game that requires a degree of difficulty and possibly suspense. Each game is designed to be different and unique. On the contrary, the use of iTours is meant to be as obvious as possible. Navigation is meant to be the same from iTour to iTour, and as similar as possible to other iTours available to the public. iTours are not meant to frustrate or challenge.

There are many types of new media including games, web sites, online encyclopaedias, electronic books and magazines, kiosks, multimedia databases, training tutorials, interactive education, music, art, sales and marketing brochures, and presentations. These are presented on computers, on the Internet, on Intranets, networks, workstations, CDs, DVDs, PDAs, mobile phones, hand-held gaming devices, telephones and other electronic devices (hand-held or otherwise). Even online help and iTours fit this genre.

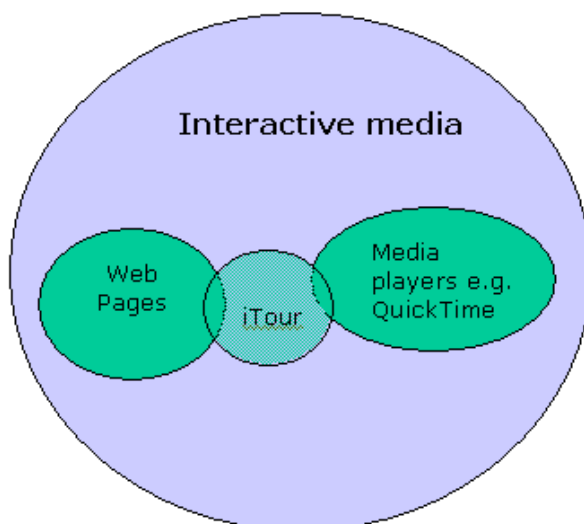


Figure 41: Hybrid design of iTours

In conclusion, the iTour is a hybrid design using elements of web or multimedia design combined with a media object interface and navigation, similar to QuickTime, Real Media and Windows Media as illustrated in Figure 41. There will be differences and similarities depending on the level of similarity between the iTour subset and the new media object.

10.5 Revisiting the literature review

In this final chapter I have provided a summary of the iTour research and project outcomes, with conclusions on the research questions. I now reflect on the original literature review documented in chapter 3: Literature Review, commencing on page 35 to determine if early

strategies and suggestions from the journals and books for designing multimedia were effective in designing iTours.

In the original literature review, four strategies were found for dealing with design. The first was a user-centred approach (see Grice 1995; Mason 1997; Hayhoe 1998; Rehling 1999). This research has found that this advice holds true for iTour design, in that the design process must be user-centred and the technical communicator must still understand the information requirements of the user.

Rehling's (1999) advice on comparative media research is relevant to multimedia design overall, and is useful for determining whether the iTour is appropriate for the audience and purpose of the documentation. A designer may, however, wish to do the comparative media research before embarking on the iTour design. Mason's (1997) recommendation that the documentation must be appropriate to the ability level of the user is relevant, and further research is recommended here to determine if the iTour is useful for all users in all situations.

I concur that mastery of the tool set is independent of understanding how to communicate with the media (see Hayhoe 1998). I disagree with Martin (1995) that the medium is always secondary. The medium is important for conveying the message and a strong understanding is necessary in order to know how to convey the message correctly.

Grice's (1995) "Focus on Usability" is valid in stating that the designer must ensure that the design is user-centred, sufficient, accurate, brief, instructional, logical, informative, and task-oriented, and that the focus is on the designer as the source of usable information.

Price's (1997) object-oriented approach is too complex for iTour development, especially as information does not flow between the iTours.

December (1996) first describes six elements: audience; purpose; objectives; domain (subject); specification (including constraints and elements); technical structure (including description of hypertext); and multimedia. Sub-project 1 reflected these same elements including the separation of multimedia when the multimedia was new and considered separate to the design process. With Sub-projects 2 and 3, the documentation and multimedia were the same; so it was not a separate consideration added at the end, but was integral to the whole design process.

December (1996) next describes planning, analysis, design (mapping web pages and specifying interfaces), implementation, promotion, and innovation (constant improvement). This approach hints of elements of software development and the traditional waterfall methodology (Boehm 1988) where there is a step for design, and so it is locked in after analysis and before implementation rather than taking place throughout.

December's (1996) approach and the iTour approach also diverge as follows:

- December considers promotion an essential step in a multimedia project. I disagree that this should be included, otherwise one could have a range of steps that deflect attention from the core of the project;
- December also categorises innovation as a separate activity; in the iTour approach innovation happens throughout the project and so does not stand out as a separate step;
- The iTour approach had steps for observing and reflecting on the outcome, which December's approach did not include; and
- The iTour approach did not have a separate step for analysis, but incorporated it into Planning and Developing: steps one and two.

As Bergeron and Bailin (1997) point out, the design and creative limits of interactive online documentation are subject to platform constraints. My research showed that the designer does not necessarily have to have a complete understanding of the platform, but either there must be someone, such as a new media expert in the project, who does; or a tool such as Macromedia Captivate should be acquired to produce tours.

Martin (1995) also points out that teamwork and project management are crucial. Learning to work with a team was a significant shift in the way I was used to working as a technical communicator, where I worked alone or with one or two other technical communicators.

Tomasi and Mehlenbacher (1998) suggest that the multimedia team structure is closer to that used for software development. I agree there are some similarities, but there are differences with the traditional software development team; for example, with the inclusion of graphic designers, and multimedia specialists.

I found Rehling's (1999) advice appropriate for my research in that project managers need to combine the efforts of members who traditionally work separately such as web- and paper-based specialists.

Bergeron and Bailin (1997) say that it is more difficult in multi-authored projects to impose a common style that seamlessly integrates with content from another author. I agree; however, when there was one person with editing power over the whole project, as Nielsen (1990) suggests, this was less of an issue. In a large project, I also found that it was important to have a comprehensive and up-to-date design document that the team followed; and that the project manager, artistic director or 'editor' needed to both shape the work and check the outcome of the work frequently.

Some of the advice on individual design elements focused on the use of the media. The advice that was most useful was that of Connelly (1995a and b) and Dowhal et al. (1993) on video production. Although not identical to iTour production, there was enough similarity to assist when I was starting out. From these sources I acquired an understanding of the requirements for the team, project planning, activities, and expertise needed. I was also able to start the mental shift in thinking about preparing online documentation to embracing iTour development. Dowhal et al. (1993) also recommend looking at other examples, in that case videos, to learn from others' mistakes.

Another useful recommendation that users should be able to start, stop and review a video sequence at will (see Hackos and Stevens 1997) was relevant to iTours. Horton (1994) recommends using 'VCR-like controls' for animations, and advocates using ten types of controls. I recommend updating this, to advise using controls similar to those in popular media object controllers such as QuickTime, Real Media and Windows Media (Horton 1994, p.327). I also recommend exploring the minimum number of controls needed to ensure an effective design.

Mason (1997) proposes developing a balance between too much and not enough navigational freedom, which my research supports. At the time I was not sure how significant his advice was; but in hindsight, this advice was extremely relevant.

Rosenbaum and Bugental's (1998) discussion on the layout to support the user's task was appropriate in regard to the navigation. They suggest making the object of interest large and centrally located, with choices visible at all times. The iTour usability testing results supported this view. Through the usability testing, the navigation in the iTours changed from one replay button displaying only at the end of the animation, to a clearly visible navigation control bar with all functionality visible at all times.

Dowhal et al. (1993) also compare using in-house staff with hired actors who may not show the same enthusiasm. From my research and practice, points in favour of using in-house staff are:

- In-house staff understand the concept being described and so may convey more authority and interest in the subject; and
- In-house staff can cost less although more time is spent preparing them and getting them over their fear of the sound room when they see it and have to record in front of a sound engineer.

Points in favour of using professional voice models are:

- The models will generally do a recording more quickly and professionally than inexperienced staff members;
- There is a wide range of voice types from which to choose; and
- There is a better chance that the models will be available in the future.

As Martin (1995) predicted, technical communicators must now learn new skills to convey their message using the evolving technology. He describes how writers must learn to storyboard and then lists the other people who work on multimedia and the skills they must develop: editors (edit audio and video scripts); graphic designers (develop appropriate screen layout and colour schemes); usability testers (test design); and project managers (coordinate the new activities).

The research shows that technical communicators do need to learn new skills, but I do not believe that they are limited to storyboarding and should include all the skills mentioned previously. However, the process is simplified when assisted with third-party tools on the market, available to manage the design and development of iTours. The one drawback is that in the process of redesigning, technical communicators can lose opportunities to advance the iTour interface.

10.6 Beneficiaries of the research

The iTour Project was a study of the design of online interactive animated tours (iTours) and it has achieved its goal of establishing a knowledge base for technical communicators and new media designers working in this area. The outcome of this research is applicable to other researchers, technical communicators, iTour designers, and managers involved in the oversight of projects that include iTours.

With the publication of this project, researchers now have a new adaptation of a research methodology applicable to the study of design within the iTour online animated tours. In this project the approach was developed to manage the iTour development, but could be used more widely in other new media design projects.

The outcomes of the sub-projects and the resulting Guidelines and comparisons are useful for technical communicators who wish to move into the development of iTours. The purpose of this research was to assist with reorienting technical communicators in the composing process that is required with this form of new media development. The project also provided definitive models, methodologies, processes and techniques required to design and test effective interactive animated tours.

This work is also suited to the designer who is interested in iTour design, but may not have the technical communication skills required for a successful outcome. It also provides

guidance and advice for the project manager who wants to understand how to approach and manage such a project, and appreciate what is involved. They can also see first hand the consequences of certain steps such as usability testing, and the importance of the approach outlined.

10.7 Knowledge and experience acquired

I came to this research with two decades of experience in technical communication, as well as software development, testing and project management experience. What I lacked was experience and knowledge of designing new media and usability testing.

Since my research commenced, I undertook courses and reviewed literature in new media development, graphic design, sound editing, animation, and usability testing. I improved my knowledge of project management by taking a formal course in the subject, as my experience prior had been through hands-on management.

I gained direct experience in working with multimedia designers, in project managing these projects, and in designing animated online interactive tours myself. This provided me with the capability to move from being engaged as a technical communicator with RMIT University for one month, ultimately to managing the Online @ RMIT environment used by over 40,000 students and 5,000 academic and other staff members as well as members of the community.

Over the course of this research, I changed my approach to testing so it could be applied to iTours, and I learned how to apply usability testing and document the outcome. I also learned another style of writing, that of an academic researcher, and learned how to present information to industry peers.

As a result of this research I gained extensive knowledge in research methods from reading widely on the subject. Through the reflexive nature of the research, I refined the action case and transformed it to the design action case for use with project-based research, which uses both design research and action research. This also led to the refinement of the design enquiry paradigm.

The project posed an enormous challenge for me to engage in the use of animation with technical writing to form the iTours. The end result is the change from my being a technical writer to a technical communicator capable of fully engaging in designing and testing iTours.

These activities are explained more fully in 12.1 Appendix 1: Researcher, page 211.

10.8 Implications for further research

This iTour project has been an empirical study of the design of online interactive animated tours (iTours). The result has been advances in both design and test practices, and formulation

of an epistemic framework in which future research can be situated. The outcome of the research is encapsulated in a web site that binds the artefacts of the design sub-projects.

At this point my PhD research ends. I invite other researchers interested in applying new media to technical communication to use this research as an entry point and to continue this journey into the future.

10.8.1 Entry points for future research

1. Further exploration of design research to better establish this paradigm;
2. Exploring the evolving interface of the iTour; for example:
 - Finding iTour interfaces that facilitate use by the sight-impaired such as exploring features that increase the size of the animation; or that allow the user to zoom in on sections of the animation;
 - Continuing the research into voice-overs so technical researchers can understand the optimal use of voice with iTours;
 - Working to simplify the iTour interface by establishing the minimum number of navigation controls required by iTour users; and
 - Researching search capabilities so a user can search from outside the animation or within, to find a point anywhere in the animation.
3. Continuing the exploration in usability testing with iTours to determine the optimal way of testing the iTours; for example, in terms of cost effectiveness.

10.8.2 Further research questions

Further research questions influenced by the writings of Chapman (2002), Monk (2002) and Plaisant and Shneiderman (2005) focus on interactive animation. The questions are included with their implications below:

1. Before the convergence of telecommunications and multimedia in conjunction with improvements in microprocessor power and storage capacity, when animation was viewed on TV or in the cinema, it was linear and controlled by the animator. Now with the Internet, animation can be non-linear and a level of interactivity can be provided to the user. **What is achievable with interactive animation and what are the limitations?**

Implication: This question could result in an exploration of what is possible within the realm of computer animation. If the question were applied to iTours it could result in a collection of designs with possible extensions and improvements on what is currently available plus it would include identification of the boundaries.

2. **With interactive animation, what can make the user experience fun and engaging?**

Implication: First, the concepts of ‘fun’ and ‘engaging’ need to be measured. As recommended by Monk (2002), these concepts could be divided into components that are measurable or at least specific, to identify when fun and engagement are present or missing. Next the iTours could be designed using strategies that incorporated the components of fun and engagement. After this a methodology and a series of tests could be devised to measure the outcome. The implication could be a more enjoyable outcome and the understanding of what makes an iTour more enjoyable.

3. **With limited bandwidth, what features can be optimised to produce more efficient running animations?**

Implication: During the iTour project I was unable to use third-party products to create iTours used in production as the resulting size and bandwidth was too large for our students using modems. As a result I used the tools to prototype drafts, but had the final version hand-coded using Macromedia Flash to ensure that the footprint was as small as possible.

This question could be explored in terms of specific interaction animation development tools as well as third-party products available to technical communicators to develop iTours. This question can also evaluate the programming code required to produce a particular feature and explore ways of optimising this code.

4. With the convergence of animation and interactivity there is an expectation by users that they can search objects for information. **What strategies and programmatic approaches to searching animations for information are there?**

Implication: iTour search possibilities are currently very limited e.g. restricted to meta-data applied to the whole animation, or a hand-coded index linked to pre-specified points within the animation, or using the forward and back controls to move around the iTour. Yet if users are to use and rely on iTours as a form of documentation, then it is necessary to improve this capability.

5. Plaisant and Shneiderman (2005) define three genres within the field of recorded demonstrations as: video movies which record a person using an interface; composed animations that are sophisticated demonstrations with additions such as explanations of algorithms underlying the search interface; and recorded demonstrations which include narration and a replay function.

The genre categorisations could be extended to define the relationship between the iTour and the software being demonstrated such as whether the iTour is “embedded” within the

target software product; or “independent”, operating outside and separately from the software.

Another genre could relate to whether the iTours *use* the actual software interface when demonstrating, rather than represent it merely as an image. This type of iTour could be classified as a ‘Real Interface Demonstration’ and would be of more use to visually impaired users as it would provide them access to the actual interface being demonstrated, not only a replica.

What other genres can be defined? What further research can be applied to explore these new genres?

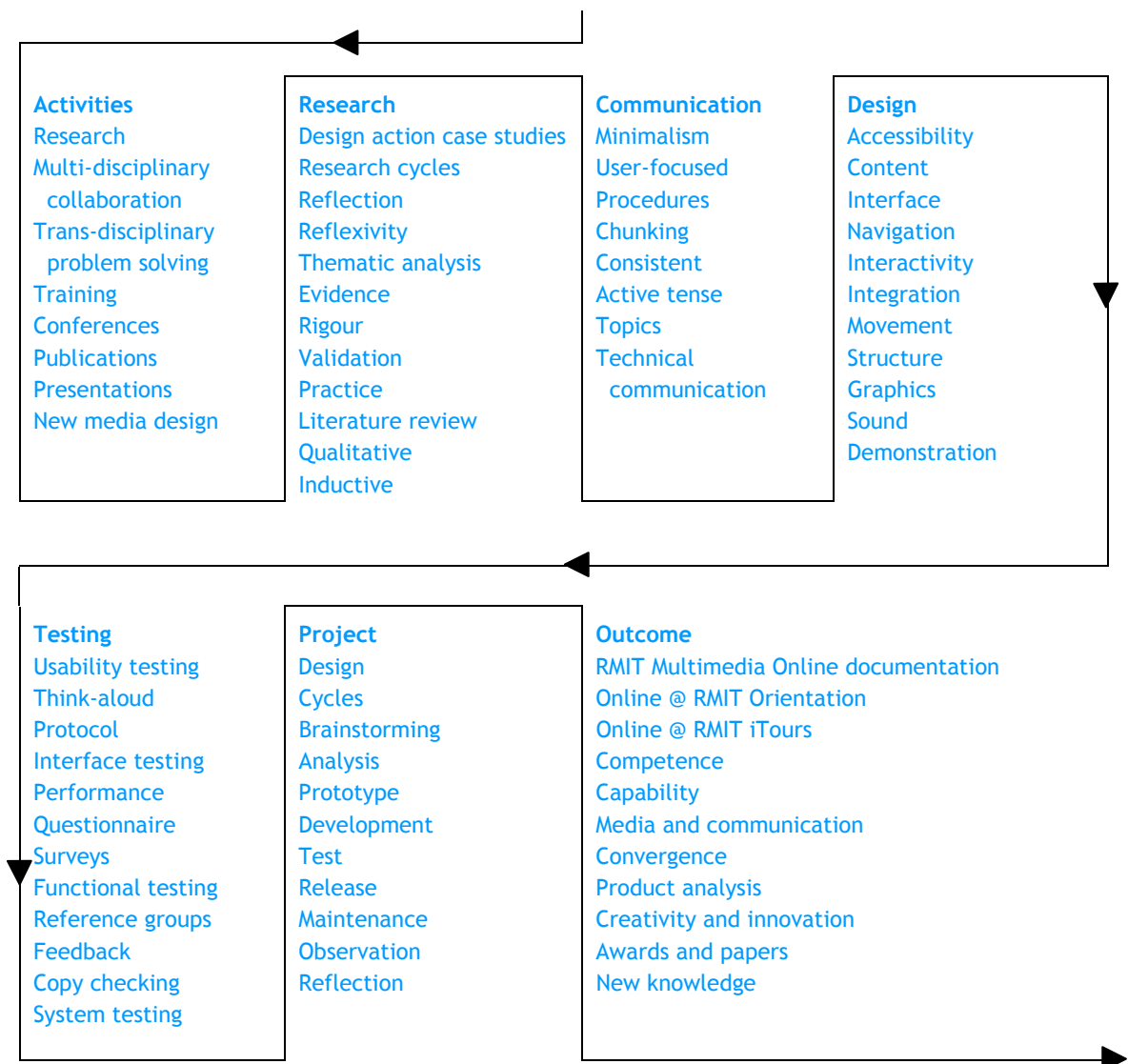
Implication: Each new emergent genre offers new possibilities for exploration that can result in further research, guidelines and exemplars to facilitate the learning process of new designers.

These are some questions, but there are many more potential avenues of research such as:

1. Explore originality versus consistency within animation, and especially within iTours;
2. Explore the application of graphic design, which is traditionally a paper-based art form, to animation—iTours;
3. Study the dimension of time and its effect on the design of animation, in particular for iTours;
4. Investigate movement and object integration within an animation;
5. Reviewing traditional animation and game-based animation to determine if there are techniques that could be used in iTours.

10.9 Afterword

This brings us to the end of this phase of the journey that saw my introduction to animation within documentation, the pursuit of design ideals for the iTour, and the creation of a knowledge base filled with iTour information. I have assembled this knowledge for technical communicators, designers and other interested people so that along the way they may experience ...



11 References

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12 Appendices

12.1 Appendix 1: Researcher profile

At the commencement of the Masters research in 1997 within the School of Creative Media, RMIT University, I had been involved in technical writing, software development and project management in the software industry for 15 years, including a five-year period when I owned and directed a company that specialised in technical writing and software implementation. The reason for commencing the Masters research was to learn about new media and to determine how it could be incorporated in user documentation.

In 2002 I was accepted as a PhD candidate within the School of Creative Media, RMIT University. I narrowed the focus of the research from using any form of new media with documentation to studying a particular form of documentation with animation, which I called the iTour. I also deepened the enquiry to support achievement of original and significant work.

The following timeline of research also includes external validation and achievements:

Table 45: Timeline

Research	External Validation and Achievements	External Work
1997 Commenced Masters level Research		
1997 Literature search and analysis of current research in online information and interface design, which covered online documentation, hypermedia, interactive multimedia, usability testing. Focus on research published in Journal of the Society for Technical Communication (1991–1999), IEEE Transactions on Professional Communication (1987–1999) plus major published textbooks (1999).		1997 to 1998 Commenced work at RMIT University as technical writer for the RMIT Online Multimedia Project. Developed documentation for students and tutors who use the resulting system. Managed the operation of the environment and the tutors who supported the learning system. Managed the testing of the new environment with 100 students.
1997–1998 Development of Student documentation for Online Multimedia Project—first inclusion of animation in online documentation for this research.	Awarded Australian Society of Technical Writers (Vic) Annual Technical Writing Award (1998) (First Prize)	1997–8 worked as technical documenter and trial manager. Presented results of trial of OMP courses on 100 students to RMIT Teaching and Learning forum.
1998–1999 Familiarisation with multimedia software, HTML, Flash, Photoshop, Sound Edit 16, Director and Usability Testing, computer-based animation.	Presented paper on analysis that was published in the Ideas to Communication Proceedings: Australian Society for Technical Communication (Vic) conference, Melbourne, Australia, Nov 12–13, 1999.	1998 Founding member of RMIT first central online learning system team—Online @ RMIT (known internally as the DLS). 2001 Project Management training to supplement experience.

Research	External Validation and Achievements	External Work
1999–2000	Work was selected for inclusion with 2000 RMIT101 CD. Distributed to 15,000 first year RMIT students and to 5,000 faculty/staff members.	1999–2000 Component Assessment and Documentation Manager, DLS. Amongst other activities:
2002 converted Masters to PhD		
<p>Late 2001–2005 Project Manager and Designer of Online @ RMIT iTour prototypes and production versions; validation of effectiveness of iTours through two cycles of usability testing.</p>	<p>Online tours included with Online @ RMIT system used by 40,000+ students.</p> <p>Received 7000+ visits in the 12 month period since release. Co-wrote and/or presented papers:</p> <p>Co-wrote “Esubmit” (Gregory and Weiss 2000)</p> <p>“From Genesis to Infinity or 0 to 50,000 Online Students in 2 years” (2000) presented at Educause in Nashville</p> <p>“Redefining Teaching and Learning Organisations: Online Learning Systems and Organisational Change”, co-authored with Quealy J., Kennedy P., Williams R., and Russo A., presented at the International Conference on Learning and Teaching Online, 10–12 January 2001, Guangzhou, China.</p> <p>“A User Centric Approach in Designing <i>Enacted</i> an eLearning Tool” (Weiss et al. 2002) Presented at Design and Development: International Best Practice to Enhance Corporate Performance, October 21 - 25, 2002 at RMIT.</p>	<p>2000–2003 DLS Systems Development Project Manager.</p> <p>Managed software development, testing and technical communications team. Oversaw growth of system from 4,000 students to 40,000+ including international installations in Vietnam.</p> <p>2003 DLS Manager—added to the above, management of all of the Distributed Learning System (DLS) with 15 staff including support both local and international (predominantly Africa and Asia).</p> <p>Project Manager and designer of iTours.</p>
<p>2004–5 Development of interactive animated software tour Guidelines.</p> <p>Wrote Exegesis.</p> <p>Developed web site to house project.</p>	<p>Wrote papers on the research:</p> <p>“Controlling An Interactive Animated Guided Tour” (Weiss 2004) (Published in the December 2004 Southern Communicator—the Technical Journal of the Australian and New Zealand Societies of Technical Communication.)</p> <p>Presented results from the iTour project at AODC (Australasian Online Documentation) Conference May 4–6, 2005 (Weiss 2005).</p>	<p>2004–5 Technical Analyst, Infrastructure Services.</p>

12.2 Appendix 2: Concept map

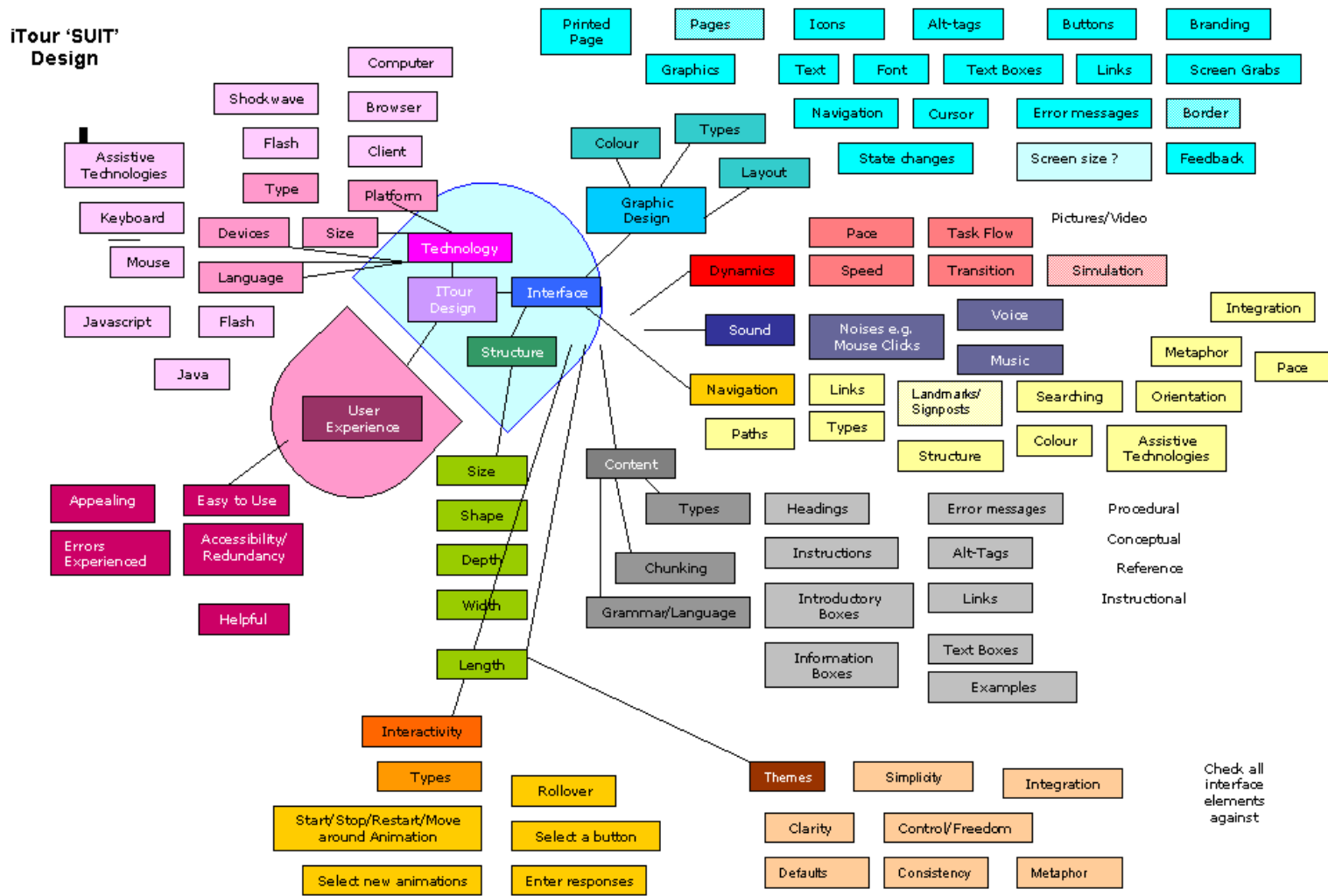


Figure 42: Concept map

12.3 Appendix 3: Trademarks

Bugs Bunny is a trademark and copyright of Warner Brothers.

Camtasia is a trademark of TechSmith Corporation.

Information Mapping is a registered service mark of Information Inc.

Macromedia Flash, Shockwave, RoboDemo, Dreamweaver and **Captivate** are registered trademarks of Macromedia, Inc.

Microsoft Windows Media is a registered trademark of Microsoft Corporation.

Netscape is a trademark of Netscape Communications Corporation.

Post-it Notes are a registered trademark of the 3M Company.

Questionmark is a registered trademark of Question Mark Computing Ltd.

QuickTime and **Macintosh** are trademarks of Apple Computer, Inc.

Real Media is a registered trademark of Real Networks Inc.

WebBoard is a trademark of Akiva, Inc.

12.4 Appendix 4: Ethics application

Sections of Ethics Application that contain information relating to this PhD research:

B1. Title of Project: **The iTour Project: A Study of the Design and Testing of Effective Online Animated Tours as a Form of Interactive Online Documentation**

B2. Project description: for HREC assessment of ethical issues.

This research project will investigate how to design and test the effectiveness of a specific type of online Internet-based documentation, called online interactive tours. The aim of the research is to establish guidelines on online interactive tour design. The project will provide research in an area with minimal research, will provide definitive design models for technical writers producing online guides, and create a knowledge base on online interactive tours.

Originally a Masters level project it was upgraded to a PhD project. The PhD component includes the following:

Test the effectiveness of a tour that has already been created;

Prepare initial guidelines for other technical writers to use as a reference for creating interactive online tours;

Review and analyse three examples of animated interactive online tours;

Extend the literature to cover usability, interactive media and online educational courseware;

Create a new tour following the guidelines compiled previously;

Test the effectiveness of the tour;

Write up findings, finalise guidelines and document project.

The effectiveness testing forms the qualitative research for which permission is being sought from the ethics committee.

The information gathered will come from RMIT students, RMIT staff, and technical communicators. It is important that participants are drawn from the RMIT community, as it is for this community that the tours are being developed.

RMIT staff and students will be shown the tours and asked for their feedback, after which they will be provided a questionnaire to complete. Expert users from the technical writing community and associated fields such as multimedia will be asked to view the tours online and then complete a questionnaire. Their feedback will be used to refine the tours and refine the resulting guidelines.

RMIT staff will be asked to assist me with effectiveness testing as part of their work duties.

Sample draft questionnaire and interview schedules for the usability test were attached with the original ethics application and subsequently followed. The questionnaire for the technical writing will ask them to review a set of guidelines and will ask for their comments in terms of how useful the guidelines are and if there are any changes that should be made. No personal details will be requested.

B3. Proposed commencement of project Masters

Project is underway.

B4. Proposed duration of project; proposed commencement/finish dates.

26/2/97 to 26/8/05

B5. Source of funding (Internal and/or external)

Research is funded by the research candidate.

B6. Project grant title; proposed duration of grant (where applicable)

Not applicable

Section C: Details of Subjects

C1. Number, type, age range, and any special characteristics of subjects

20 RMIT staff and/or students, plus two ITS.

20 people working in the technical communication or associated field.

C2. Source of subjects (attach written permission where appropriate)

RMIT and the technical communication industry.

C3. Means by which subjects are to be recruited

RMIT staff and/or students will be approached via an announcement on the Login page of Online @ RMIT, posters requesting volunteers and requests to staff members to ask students if they are interested in volunteering.

Technical communicators will be approached via email to professional bodies including the Society of Technical Communicators, and the Australian Society of Technical Communicators. Other peers who have been following the research and who have expressed interest in the research will also be asked for feedback.

Staff members who assisted with the effectiveness testing will be recruited from the team working for me in the DLS. They will be asked if they wished to participate.

All volunteers will receive a written explanation of the project.

C4. Are any of the subjects "vulnerable" or in a dependent relationship with any of the investigators, particularly those involved in recruiting for or conducting the project?

Yes—with one of the three sub-projects completed for this research, three staff members who reported to me at the time were involved. These staff worked on usability testing for me, provided feedback on research, and the two Technical Writers put some content on to the RMIT web system for me.

My position at the time was their manager. The staff included Jason Snell, the DLS Tester, Doug Oldmeadow, the DLS Technical Writer and Training Coordinator, and Ben Melbourne, DLS Technical Writer. These staff members have been provided plain text statements and have signed a consent form. Please note that this research has already happened and is now finished.

Section D: Project Classification and Estimation of Potential Risk to Subjects

D1. Please identify the project classification by assessing the level of risk to subjects

Risk level 2

D2. If you believe the project should be classified Category MR or Category NR please explain why you believe there are minimal or no risks to the subjects.

Originally the project was identified as NR under the old classification. I wish to seek an upgrade to MR or Risk level 2:

The subjects will voluntarily participate in interviews and or complete a questionnaire. I will have no relationship with any of the subjects, for example none are students of mine. I will take notes during the interviews, which I will subsequently send to the interviewees for approval and modification if required. I will report on the data without identifying any of the participants by name. Notes taken during usability testing and forms filled in by the participants will be stored in a locked cabinet in an office in my home. This data cannot be linked back to the student. Non-identifiable student responses will be part of the raw data used in the research and will be available for study but in no way can this data be linked back to a student. The data will be kept for five years after the award of the qualification.

For the technical communicators who provide their opinions via the online questionnaires, I will not record their names or contact information, after the questionnaire has been closed data will be transferred to disks and removed from the server on which they were collected. There will be no electronic identifier linked to the respondent. The data will be kept for five years after the award of the qualification in a locked cabinet to which I have sole access. I will report on the data without identifying any of the participants by name or institution.

The research has been upgraded now to risk classification 2 as over the course of the research, three staff members who reported to me at the time, DLS Tester, DLS Technical Writer and Training Coordinator, and DLS Technical Writer did usability testing for one part of the three sub-projects that make up the research, provided feedback on research, and the technical writers put some content on to the RMIT web system. They have been provided plain text statements and have signed a consent form. My position at the time was their manager in the DLS.

OR

If you believe the project is classified Category AR please identify all potential risks to subjects associated with the proposed procedures. Please explain how you intend to protect subjects against or minimise these risks.

D3. Please explain how the potential benefits to the subject or contributions to the general body of knowledge outweigh the risks.

All due care to be taken concerning the subjects and maintenance of data as outlined above. The feedback should lead to guidelines that will promote more effective communication by technical communicators.

D4. Contingency Planning: First Aid / Debriefing

Not applicable

See next page for risk checklist.

D5. Please complete this checklist and give details of any other ethical issues that may be associated with this project.

Note: All questions have been answered with a no.

		Yes	No
(a)	Is deception to be used?		✓
(b)	Does the data collection process involve access to confidential data without the prior consent of subjects?		✓
(c)	Will subjects have pictures taken of them eg, photographs, video recording, radiography?		✓
(d)	Will participants come into contact with any equipment that uses an electrical supply in any form eg, audiometer, biofeedback, electrical stimulation, etc?		✓
(e)	If interviews are to be conducted will they be tape-recorded or videotaped?		✓
(f)	Do you plan to use an interpreter?		✓
(g)	Will participants be asked to commit any acts, which might diminish self-esteem or cause them to experience embarrassment or regret?		✓
(h)	Are any items to be taken internally (orally or intravenously)?		✓
(i)	Will any treatment be used with potentially unpleasant or harmful side effects?		✓
(j)	Does the research involve a fertilised human ovum?		✓
(k)	Does the research involve any stimuli, tasks, investigations or procedures that may be experienced by subjects as stressful, noxious, aversive or unpleasant during or after the research procedures?		✓
(l)	Will the research involve the use of no-treatment or placebo control conditions?		✓
(m)	Will any samples of body fluid or body tissue be required specifically for the research that would not be required in the case of ordinary treatment?		✓
(n)	Will subjects be fingerprinted or DNA "fingerprinted"?		✓
(o)	Are the subjects in any sort of dependent relationship to the investigator/s?		✓
(p)	Are subjects asked to disclose information which may leave them feeling vulnerable or embarrassed?		✓
(r)	Are there in your opinion any other ethical issues involved in the research?		✓

Where you have ticked 'YES' to any of the questions on the checklist, please give details and state what action you intend to take to ensure that no difficulties arise for your subjects.

Details [except (a) and (b)] must be included in the Plain Language Statement.

Section E: Informed Consent

E1. Attach to the application-PLS & Consent Form.

Plain language forms and consent forms were presented to staff and students involved in testing.

Plain Language statements will be provided online with RMIT logo for participants providing information online; it will be provided on letterhead for participants involved in face to face interviews.

E2. Dissemination of results

In a PhD project, academic papers and in lectures on the subject.

E3. Participants under 18 years

Not Applicable

E4. Persons subject to the Guardianship Act (Vic)

Not Applicable

Section F: Confidentiality of Records

F1. Describe the procedures you will adopt to ensure confidentiality.

All information collected will be stored within my office in my home in a locked cabinet. During the collection of data, information stored on any server I use will be password protected. No data will be able to link back to the person who filled in the form as their name will not be recorded with it. Names will not be used in any of the reporting, analysis or quotations.

F2. Who will be responsible for security of confidential data?

I will be responsible for the safe storage of the data.

F3. How long will data be held?

I envisage keeping the data for five years following the completion of the degree in accordance with the requirements of RMIT.

F4. Who will have access to the data, and for what purpose?

After the questionnaires are completed, I will be the only person with access to the data; the supervisor will have access to the data analysis, but not the raw data. And this analysis will appear in the research.

F5. Does this project involve the use of personal information obtained from a Commonwealth department or agency?

No.

Section G: Other Issues

G1. Do you propose to pay subjects? If so, how much and for what purpose.

Yes. \$30 gift voucher from RMIT bookshop, to reimburse students who participate in the usability testing. Participants completing online information will not be given vouchers.

G2. Where will the project be conducted?

At RMIT.

G3. Is this project being submitted to another Human Research Ethics Committee, or has it been previously submitted to a Human Research Ethics Committee?

No.

G4. Are there any other issues of relevance?

As requested here are a short list of example questions:

<p>For approximately how long have you used a computer as a tool? (Choose one)</p> <p>a. Less than 6 months b. 6 months–1 year c. >1 year</p> <p>How often would you use the Internet? (Choose one)</p> <p>a. Daily or more often b. Once a week c. <Once a week</p> <p>Your age (<i>Optional</i>-choose appropriate range)</p> <p>a. <24 b. 25–29 c. 30–34 d. >35</p> <p>Your gender? (<i>Optional</i>)</p> <p>a. Male b. Female</p> <p>What is your relationship to RMIT (Choose all relevant)</p> <p>a. Student b. Academic Staff c. Non-academic Staff</p>	<p>About the animations</p> <p>a. Take too long to load?</p> <p>i. Yes ii. No</p> <p>b. Once running, was the animation</p> <p>i. Too fast? ii. Too slow? iii. The right speed?</p> <p>c. Were they easy to use?</p> <p>i. Yes ii. No</p> <p>If no, please explain:</p> <p>In this test, which type of documentation did you prefer?</p> <p>a. Text and graphics based documentation. b. Animation based documentation.</p> <p>Any further comments or suggestions regarding the documentation, including improvements:</p>
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With the online questionnaire I will not ask questions 1–6 but the questions will relate to the recipients opinions regarding a set of guidelines on designing and testing iTours.

For any further detail about completion of this form, or for additional supporting material, please contact the Secretary of your Faculty HRE Sub Committee or the Secretary to the RMIT Human Research Ethics Committee C/o University Secretariat, (03) 9925 1745.

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